McGRAW-HILL INTERNATIONAL

Management Digest

TECHNICAL • INDUSTRIAL • COMMERCIAL

JULY 1956 OVERSEAS EDITION

Through a world industry's pipelines: Oil, and yet more oil, to meet surging demand.—p9

ALSO | Does your office need a "methods man"—p21
Materials handling: new ideas—p25; new equipment—p50

THE WORLD'S PRODUCTS GO INTO BETHLEHEM STEEL

Bethlehem requires imported raw materials from 41 countries around the globe.

Chrome, tin, tungsten, manganese, fluorspar, hemp, rubber, paper pulp and chemicals are just a few of the items that either go into the steels we make or are used in the plant operations.

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Offices and representatives in all principal cities of the world

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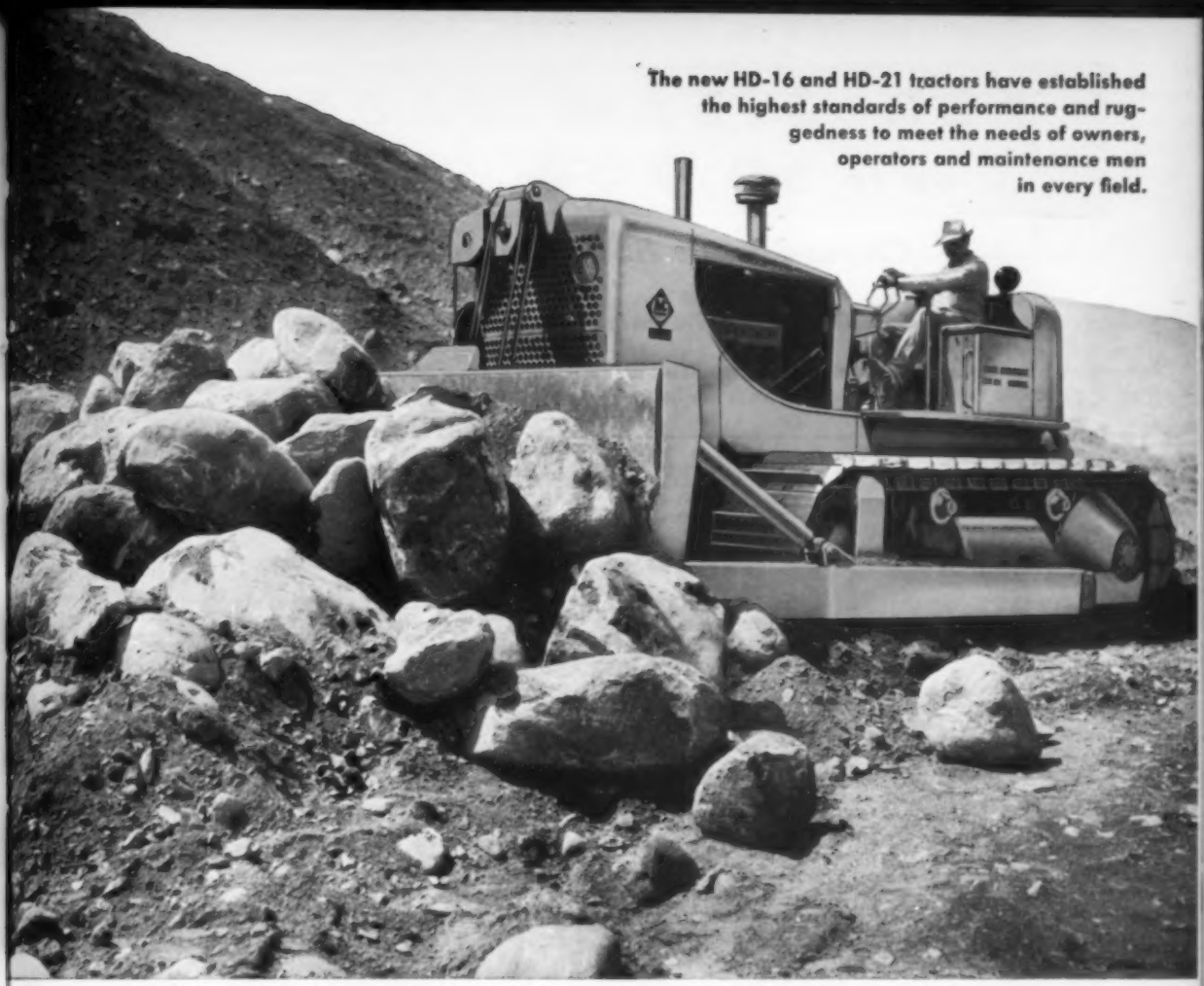

The new HD-16 and HD-21 tractors have established the highest standards of performance and ruggedness to meet the needs of owners, operators and maintenance men in every field.

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When Allis-Chalmers originated the hydraulic torque converter tractor sixteen years ago, new standards of performance were established. Today the new HD-21 and HD-16 torque converter track-type models at work in many parts of the world, are bringing new concepts of production efficiency with lowered overall costs. Here's why:

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Consult the Allis-Chalmers dealer in your area for full information on these outstanding tractors.

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TRACTOR DIVISION, MILWAUKEE 1, U.S.A.

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Weight: 44,000 lb	Weight: 31,600 lb

torque converter drive

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SINCE 1847

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For stoker firing, the VU-10 is available from 10,000 to 60,000 pounds of steam per hour.

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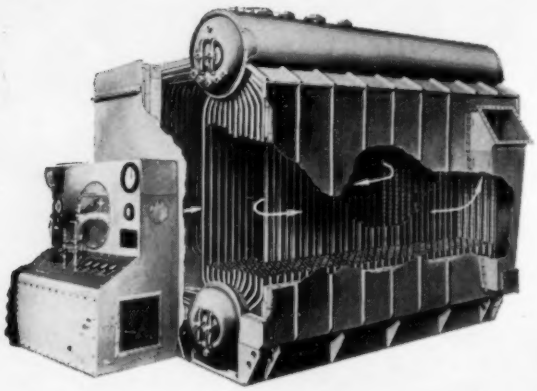
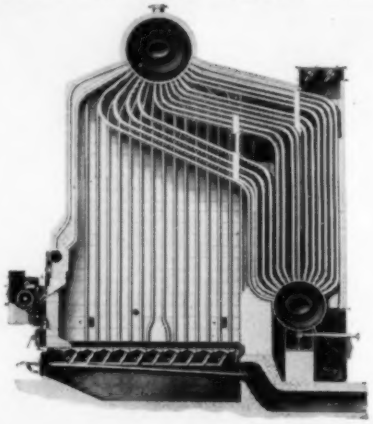


The VP boiler

The C-E Package Boiler, Type VP . . . is completely shop-assembled . . . for oil or gas firing. It is available in capacities from 4,000 to 40,000 lb steam per hr; for pressures to 500 psi. The VP Boiler has more water-cooled area per cubic foot of furnace volume than any other boiler of its size and type. The large (30-in. diameter) lower drum permits a simple, symmetrical tube arrangement . . . greater water storage capacity . . . easy access for washing down or inspection. A low-speed, centrifugal fan, which is exceptionally quiet in operation, is standard equipment. Baffle arrangement is simple, resulting in low draft loss . . . simple soot blowing . . . high heat absorption. The unit is pressure fired . . . has welded, gastight, steel casing . . . requires no induced-draft fan.



The VU-10 boiler

The VU-10 Boiler is designed for industrial load conditions, particularly for plants with small operating and maintenance forces. Capacities range from 10,000 to 60,000 lb steam per hr . . . pressure to 475 psi . . . heat recovery equipment is available if desired. Fuel can be either coal (C-E Spreader, Traveling Grate or Underfeed Stoker), oil or gas. This boiler is a completely standardized design adaptable to many conditions. It responds readily to variations in load; is simple to operate and maintain. All parts are easily accessible for inspection. Like the VP, the VU-10 Boiler is a complete unit – boiler, furnace setting, fuel-burning equipment, controls, forced draft – bringing you the benefit of one contract . . . one responsibility.

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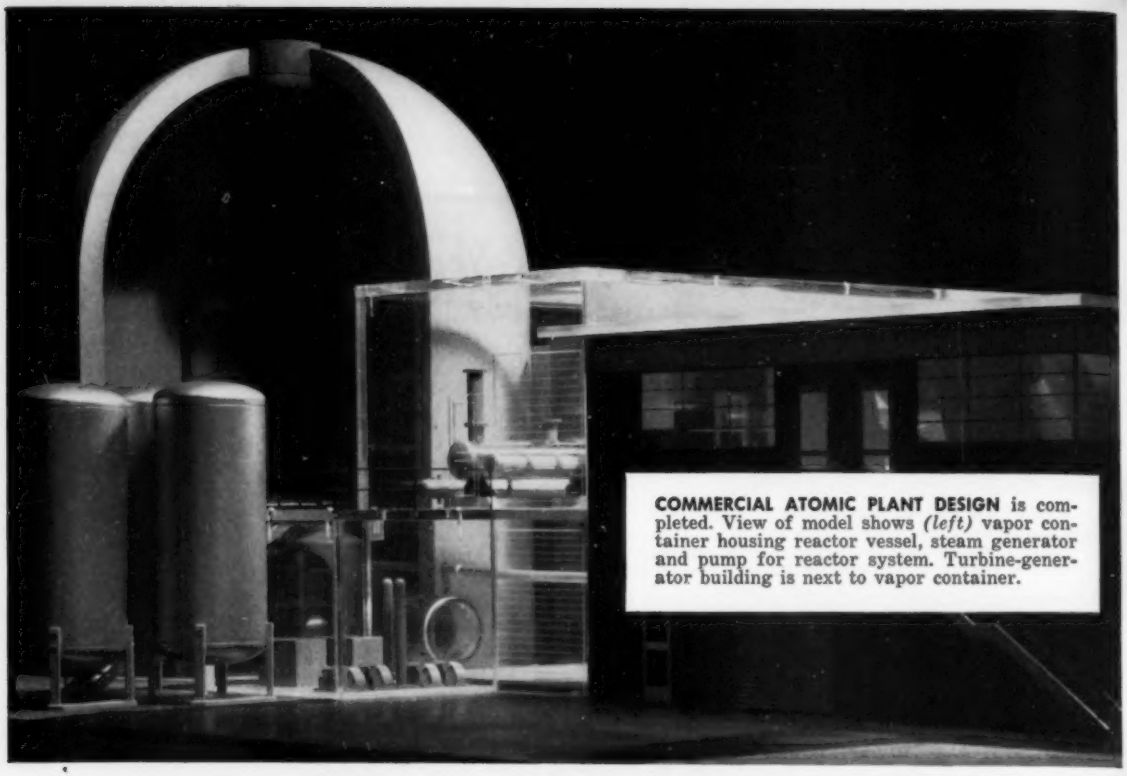


COMMERCIAL ATOMIC PLANT DESIGN is completed. View of model shows *(left)* vapor container housing reactor vessel, steam generator and pump for reactor system. Turbine-generator building is next to vapor container.

ATOMIC POWER IS AVAILABLE NOW

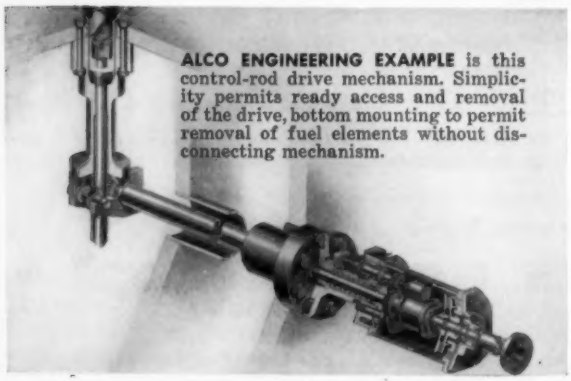
ALCO'S atomic power plants are already designed and engineered; the first is now being built; commercial models can generate stable and economical power

ALCO's atomic power plant is not a dream of the future. It's a reality. The first unit, now being built, will be in operation by early 1957, and similar ALCO atomic plants can be purchased to generate commercial power.

Design and engineering are complete for these pressurized-water atomic plants to about 12,000 kw. This means that their cost is lower than experimental reactors, and delivery time shorter.

In high-cost fuel areas, in cases of high transmission costs, or where no source of hydroelectric power is available, the ALCO atomic plant's operating cost may mean a saving. And the ALCO atomic plant is reliable in operation.

For full information relating to your specific project cable LOCOMOTIVE, New York City, U.S.A., or write the address below.



ALCO ENGINEERING EXAMPLE is this control-rod drive mechanism. Simplicity permits ready access and removal of the drive, bottom mounting to permit removal of fuel elements without disconnecting mechanism.

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WORLD TRENDS

VIEW OF THE FUTURE . . .

In 2056: A world of 7-billion people—probably more . . . Higher living standards, yet no shortage of food, materials, energy . . . An intricate new technology providing for all from the most common substances: air, sea water, ordinary rock, sunlight . . . **The one essential ingredient: "brain-power,"** in the form of educated men and women to construct and operate the new civilization.

This glimpse of the 21st Century comes from a group of natural resources specialists at the California Institute of Technology. They have made a "speculative projection" 100 years ahead, as part of a cooperative program with 27 American industrial corporations.

World population will rise in 100 years to between 5-billion and 10-billion, and possibly many more. Industrialization is going to proceed much more rapidly from now on, because techniques and "know-how" are available as never before.

The amount of food the world can produce is unlimited—if we look beyond present agricultural systems. More nutritious, concentrated plant foods can be developed; men will depend much more on these than on animal food. At least one-billion acres of new land can be made available, perhaps through irrigation with distilled sea water. The tiny plant and animal organisms of the ocean can almost certainly be harvested.

Rich metallic ores, and the other raw materials that have built the present industrial society, are rapidly being used up. But demand is rising at a fast rate. Today eight tons of steel are in use for every American; in 2056, this might be 100 tons. Yet 2056's technology will make iron, aluminum, titanium, copper, available from ordinary rock and sand; sea water can provide magnesium, chlorine, sulfur, and so on. Liquid fuels and many organic chemicals can be processed from limestone.

These developments depend on a tremendous amount of energy (to distill sea water, for example, or to power "rock refineries"). For 7-billion people in 2056, the energy equivalent of 70-billion tons of coal might come half from nuclear energy, one quarter from solar energy, and one quarter from synthetic liquid fuels (made from rocks), water power, etc. To replenish nuclear fuel supplies, it will be possible to release from a ton of ordinary granite an average 4 grams of uranium and 12 grams of thorium. **Actual experiments in California have proved that processing the granite can be done with a fraction of the radioactive energy that the granite contains.**

The exciting thing about the California report is that it is not mere "laboratory dreaming". Many of the processes are already on the horizon. But the scientists are not just talking about a vague "Utopia." Their vision is qualified by (1) the fact that a global catastrophe such as war could wreck the emerging technology forever; and (2) many of the 2056 goals will be impossible without a great increase in scientific manpower.

The scientific community will use the report to impress this second point on governments and management groups everywhere: "Brain-power" is the limiting factor. Already the world is short of scientists and engineers; in many nations intellectual talent is being wasted. The talented and imaginative must be found; and methods developed to encourage them.

Thus the report has an urgent recommendation for today. It takes 30 years to produce a trained, professional scientist or engineer. So there is no time to lose. Fortunately, manpower is the only one of the world's resources today that is replenishable.

De-luxe Rally Winners

THE ANGLIA DE LUXE

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REMEMBER THE ANGLIA AND PREFECT? The family cars that win big rallies. Here are the de Luxe versions of those very same models. Winners in style . . . winners in powerful performance . . . and oh-so-smooth to drive.

The two-door Anglia de Luxe—the four-door Prefect de Luxe—the best light cars in the World — both available from your local Dealer at a surprisingly low price. See them today.

. . . and World-Wide service too !

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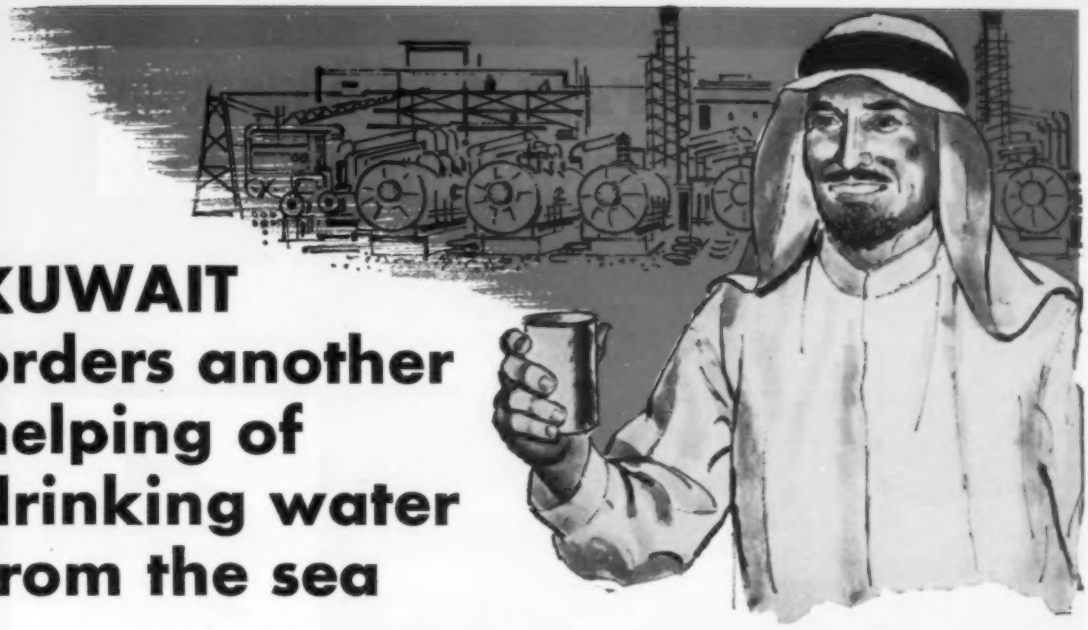

KUWAIT orders another helping of drinking water from the sea

Four Westinghouse multi-stage flash evaporators—largest of their type ever built—will soon be turning the Persian Gulf into drinking water at the rate of 2,520,000 gallons a day.

Slated to take their place next year in the Sheikdom of Kuwait beside an earlier installation of Westinghouse shell-and-tube evaporators, each of the new flash units is rated at 630,000 gallons daily—more than five times the capacity of the previous units.

More important, this vastly increased capacity, plus lower purchase and installation costs, will substantially cut the cost of water produced—an important factor in Kuwait where temperatures often climb to 167°F and water is scarcer than oil.

If you need fresh water for industrial operations or for drinking, find out now about the complete line of Westinghouse heat transfer apparatus in any required capacity. Experienced engineers are ready to survey your needs, design and build equipment, and supervise installation and operation. Write today for details.

N. F. Emig

N. F. EMIG, *Supervisor*
Steam Section

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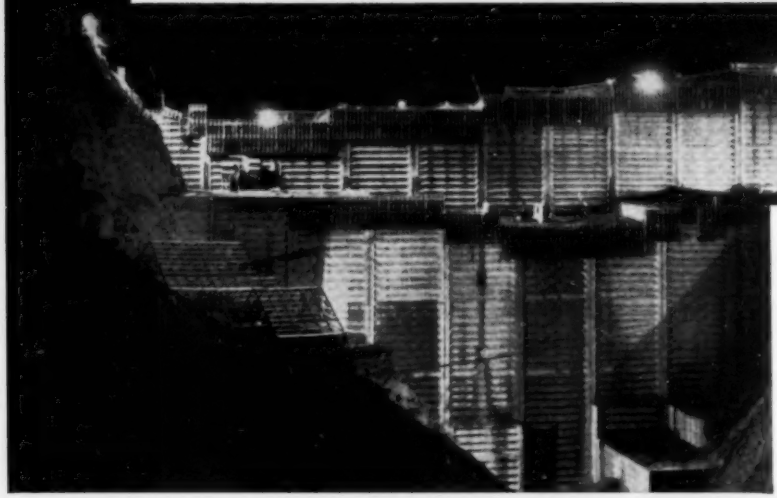
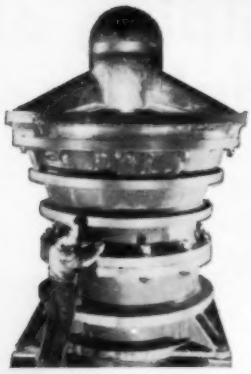
WHERE THE FUTURE IS ALREADY IN PRODUCTION

WESTINGHOUSE ELECTRIC INTERNATIONAL COMPANY, 40 WALL STREET, NEW YORK 5, U.S.A.

The World's Highest Dam . . .

Built with the aid of an Allis-Chalmers crusher!



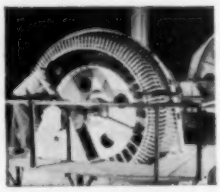


Allis-Chalmers serves the CONSTRUCTION INDUSTRY as it serves all the basic industries of the world!

"We have crushed a total of 1,700,000 cubic meters of boulders so far with our *Superior* gyratory crusher. It has been working 22 hours a day, to our entire satisfaction," say the builders of the world's highest dam, the Grande Dixence near Lausanne, Switzerland. The new dam, 921 feet high, will make possible the production of more than a billion and a half kwh of power per year.

The crusher used here is a product of over a century of engineering, manufacturing and installation experience by Allis-Chalmers—one of the world's leading machinery builders. Allis-Chalmers engineering and manufacturing ability can be applied to any industrial machine problem.

Now, through license agreements with leading firms throughout the world, certain types of Allis-Chalmers equipment are being manufactured abroad for purchase in leading world currencies. For complete information, contact your local distributor or write Allis-Chalmers, Industries Group, Export Department, Milwaukee 1, Wisconsin, U. S. A.



This crusher has given outstanding performance at Grande Dixence Dam. *Superior* gyratory crushers like this are in use throughout the world for crushing huge tonnages of stone, aggregate, taconite and other hard metallic ores. Allis-Chalmers crushers have proven unsurpassed for economy and dependability.

For Motor, Control, Drive Equipment, depend on Allis-Chalmers. Your local distributor can help you in selecting exactly the right unit or combination to meet your needs. Allis-Chalmers motors are available in a wide range of types and sizes to work with basic machines. A-C is the only company that can furnish your installation complete with motor, control and drive.

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THAILAND—Bangkok.
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TURKEY—Istanbul.
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JULY 1956
VOL. 11—NO. 7

Management Digest

The World's Oil Search Quickens

1955 production must double by 1975 to meet world energy needs. The oil industry will get bigger, face more problems, need more money.

Digested from PETROLEUM PRESS SERVICE, May, p157

As consumers of petroleum; as investors in petroleum companies; as leaders of public opinion, management men are increasingly concerned with the oil industry. Especially now—as oil seems destined to become the leading industry in the world.

It can hardly help being so. Oil is huge now. And the big growth in energy requirements over the next 20 years will have to be met primarily by petroleum. (Nuclear energy will be the primary future energy source, but its contribution for the next two decades is likely to be small compared to present sources.) Assuming that production of all commercial energy increases during the next 20 years at an average rate of 3% yearly, it will be necessary to more than double oil production—from 1955's 700-million tons to some 1,600-million tons in 1975. Indeed, according to J. W. Platt, a Managing Director of the Royal Dutch Shell Group, actual production in 1975 may be well above that level.

In response to this huge projected future need; the oil search is going on at a faster pace than ever before.

In Venezuela, the world's second largest producer, production is now over 2-million barrels daily. Over 1-million barrels a day are flowing through the gathering lines and storage tanks of just one company—Creole Petroleum Corp. (cover), a subsidiary of Standard Oil Co. (New Jersey). Yet Creole is in the process of spending $177-million on new facilities this year. And Venezuela itself is planning to grant new oil concessions—hoping to find new reserves to keep up with surging world demand.

In the U. S. A., the oil search is becoming more difficult, more costly (MD, June, p18). One company spent more than a year, and over $2-million, drilling the deepest well in the world (picture).

In Western Europe, the search is going on in nearly every country. Africa, regarded as unpromising, is now getting greater attention. That includes regions of the Sahara Desert where the oil search is one of the boldest and costliest of our day. In the Middle East, where within four countries there already lie three-quarters of the world's proven oil reserves, the search is being pursued not only in these nations but also in new areas, some uninhabited and barely accessible.

In most Asian countries, oil exploration is afoot. And the oil men are hunting in the Arctic, and throughout Latin America.

Oil exploration is exacting, costly, highly speculative; only occasionally does it bring reward to the explorer. Governments are increasingly anxious to see oil discovered in their countries—not only because it means development of a dormant resource, but also because rising consumption strains their balance of international payments. And while in some nations large-scale oil investment is discouraged by high taxes and political problems, understanding of the requirements for successful oil exploration is growing. Several countries have recently passed liberal oil legislation and

WORLD'S DEEPEST OIL WELL, in Louisiana, U.S.A., produced oil last April. Total depth: 22,570 feet. Total cost: $2-million.

have attracted the oil explorer—in numbers.

The oil business is a gamble—especially now that finding oil becomes technically more complicated and more expensive.

Several examples of persistent exploration in the face of severe discouragement are provided in New Guinea, Papua, West Australia, Nigeria. In these areas, unrecovered expenditure by the oil companies already exceed $180-million. And despite all the money and energy spent on oil exploration since World War II, only eight new producing countries have been added to the 40 producers that existed in 1939.

Yet the reward can be great. Before making the discovery in 1947 that set off Canada's oil boom, Imperial Oil Co. drilled no less than 133 "dry" holes.

There will be many more dry holes. Yet most experts believe that the world's oil resources will prove able to meet 1975's demand. Present proved reserves, according to Platt of Royal Dutch Shell, are estimated at about 170-billion barrels. (That figure is considerably less than the 306-billion barrel estimate of Wallace Pratt, the American geologist—MD, April, p19). And estimates indicate that future additions to recoverable reserves will be more than 750-billion barrels.

But to translate these estimated reserves into oil products in the consumer's hands is a tremendous job. The oil industry has many problems—and not the least of them is how to raise the money to finance the investment required. (For a look at how much the seven largest international oil companies are spending now, see the chart at left.)

One recent analysis showed that the oil industry's capital investment in 1955 was the equivalent of $8-billion. It is estimated to average $9.8-billion in the years 1956-1960, and $12.9-billion for 1961-65. Platt suggests that to cover capital spending and working funds, as much as 65% of the industry's profits will have to be plowed back; and that only 12% of the industry's capital needs will be met by the capital markets.

Yet even that small percentage would represent an average $1.1-billion a year. Platt also suggests that it is doubtful whether the industry's calls on the market with new industrial capital issues could be increased much above the expected rate in the next few years—without dangerously restricting the essential capital needs of other industries. ●

Seven Oil Companies:

What they produce, what they spend

STANDARD OIL CO. (NEW JERSEY) is biggest, produced 2.1-million b/d (barrels daily) in 1955—almost half in Venezuela. Jersey group spent $860-million last year, plans 1956 investment of $1.2-billion.

ROYAL DUTCH SHELL has tripled operations since 1946. 1955 output was 1.9-million b/d; total revenues, $5.6-billion. The British-Dutch group spent- $3-billion in five years, will invest $840-million in 1956.

SOCONY MOBIL OIL CO. produced 580,000 b/d (45% in U.S.) in 1955. 1956 spending will rise to $419-million—not including investment by producers where Socony has minority share (like Arabian American Oil.)

TEXAS CO. produced 509,672 b/d, gets 375,943 b/d more from Eastern Hemisphere interests. In 10 years, Texas has invested $2-billion in new facilities; for 1956, Texas plans a record investment budget of $325-million.

GULF OIL CORP.'s crude output rose to 886,186 b/d in 1955, half from Middle East. Capital spending was $275-million, bringing past five-year capital investment to just over $1-billion.

STANDARD OIL CO. of CALIFORNIA oil production rose 10% last year to 723,334 b/d—half from Eastern Hemisphere interests. Spending on exploration and new facilities was $347-million. For 1956: $350-million.

BRITISH PETROLEUM CO. production rose 25% to 920,000 b/d in 1955—almost all Middle East. New investment was $120-million. BP's present tanker program alone will cost upwards of $224-million.

Here is an "automated" produc line at Standard Motor Co., chining engines. Retooling Standard brought Britain's "automation strike" — and it important problems for mana ment everywhere.

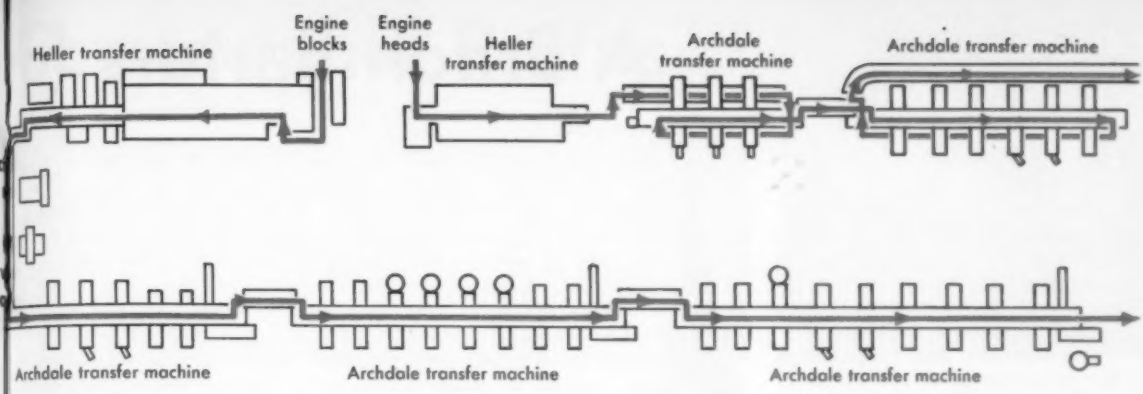
Automatio

On April 26, 11,000 workers of the Standard Motor Co., at Coventry, England, walked off the job in protest to the layoff of 3,500 of their colleagues. These men are out of work during the re-equipment of part of Standard's tractor manufacturing line with highly automatic machines. Part of Standard's "automation"—this line for small car engines—is shown in the illustration.

The striking workers went back to their jobs in May—but not before they had made "automation" a national issue in Britain, and directed world attention to this problem: What are the implications of automation for labor-management relations? You may be sure that labor unions everywhere are watching the arrival of "automated" production, and are determined to exact the best possible terms from management. And certainly industrial troublemakers are alert to every chance to create misunderstanding.

Below, MANAGEMENT DIGEST excerpts comments of two British publications—*The Economist* and *Metalworking Production*—on the nation's, and one of the world's, first "automation strikes."

The problem, suggests *The Economist*, is often one of careless and sensational use of the word "automation." In its widest sense, automation is a useful portmanteau word for forms of mechanization that involve linking, coordination, and control of simpler industrial processes. Typical examples are transfer machining (such as Standard's), automatic assembly,



Labor's Great New Rallying Cry

control engineering, data processing.

Even when properly used, the word has overtones that are becoming increasingly emotional. A Detroit business economist recently said that a month in Europe had given him the feeling that unions, social workers, and businessmen were haunted by the idea of automation.

Retooling of production lines at Standard Motors certainly includes genuine automation—though probably no greater than what has already been installed at several other motor industry plants, where no trouble arose. Certain lines of separate machine tools are being replaced with transfer machines—banks of tools linked by devices which, when one operation is completed, automatically move the workpiece into position for the next.

These lines would require far fewer men for a given volume of output. However, the object of the retooling is not merely to maintain output, but to increase capacity by some 30% to 40%. The rise in tractor output was expected to increase, not diminish, the company's whole labor force.

What happened meanwhile is that Standard is not able to switch as many tractor workers as it planned to car production, because sales are suffering from the government's anti-inflation policy at home and softening markets for British cars abroad. The most significant thing about the Standard strike, therefore, is that two years ago or even one year ago—when markets were better—re-equipment might have involved neither layoff nor strike.

But the effects of the government's economic policies were not adequately explained, nor do workers fully understand what is meant by automation. An honest explanation, suggests *The Economist*, might go like this:

"Only a fool would claim that he can tell now what the long term implications of automation will be on the pattern of employment. One thing is certain: Automation cannot occur without the effective demand to buy the extra goods. Moreover, for the next 20 years or so, Britain's main weakness in economic growth will be the shortage of people able to work, not too many people. We can expand only by a steady advance in productivity. Automation, and investment in more productive equipment generally, is the key to that expansion.

"In the short run, most of the companies that put in automation are growing anyway, and not many people are likely to lose jobs, though many will have to change the work they do. At times, when the government is putting the brake on expansion to steady the economy, growth through automation may be temporarily checked. This has nothing to do with automation, but a good deal to do with ensuring future expansion."

Further, closer consulation between industry and its workers is needed at the very inception of industrial change, says *The Economist*. The unions concerned at the factory level should be taken farther into management's confidence about its long term intentions, and given the best forecasts possible of the balance of different skills that technical trends within the company seem likely to demand.

In the midst of the automation furore, the British government's Department of Scientific & Industrial Research happened to have a study of automation ready for publication. In the opinion of *Metalworking Production*, it forms a useful basis for serious thought on the long-term questions of automation.

The report states at the outset that the high capital cost of equipment need not rule out automation for smaller firms. "Indeed," the report suggests, "the progress of automation will sometimes encourage the growth of small firms that specialize in a limited range of components, often as a service to the manufacturer of the final product. This is because size of market is a better guide than size of firm to the possible economic advantage of automation."

One limiting factor will be the availability of equipment. The DSIR study considers that a "rapid expansion of the machine tool industry appears to be necessary."

The report stresses that the gravest limitation on automation's progress will be imposed by the shortage of skilled manpower. "There is urgent need to determine the kinds of training re-

quired." Engineers with a variety of technical backgrounds will be needed, and even they will need new training courses. The same is true of the training of junior technicians and craftsmen. Industry, says the DSIR report, may have to take much more direct action to secure the technical training that its future specialists will need. And training for management will also have to be given greater consideration.

Automation's main implication for management is the necessity of maintaining a "very high order of planning and control." Management will have to overcome the technical inflexibility that tends to occur in an automatic plant. An adequate system of preventive maintenance for the new machines is another important requirement.

Metalworking Production believes the British report is weak on the subject of automation's immediate impact on labor. The study does admit that technological unemployment can result, and emphasizes that management must plan its manpower requirements well in advance, and work out ways to absorb displaced workers elsewhere in the firm. It foresees that the ratio of managers and supervisors to operators will increase, that more skilled maintenance men will be needed. Many men will have better jobs in that they will be supervising rather than directly manipulating a machine.

Commenting editorially, *Metalworking Production* remarks that it will be "no easy task to absorb smoothly, without friction, the highly productive labor saving equipment that will breed from the remarkable advances in control techniques. Recent events suggest we have barely tasted the possibilities of what is to come.

"There will be such powerful instruments of production," continues the editorial, "that we dare not turn them loose without giving much more careful consideration to their impact on the labor force than has been demanded even by machines in the past. In short, in the light of recent events, it is re-emphasized that the technical problems of automation will be dwarfed by those of human relations." ●

A Briton Barters fo

Comfortable Profits"

Digested from BUSINESS WEEK, May 19, p142

FOR Joseph W. Gillon (left), a plane trip from London Airport to points East—and Communist—is all in a week's work. As a partner in Lamet Trading Co. Ltd., a London export-import firm, Gillon knows Communist business methods well, and makes trips to East European capitals all year round.

Not long ago, he was in Prague wining and dining with top officials of Koospol, the Czech state trading company that handles grain trade. Like any tourist, he saw the Hradcany Castle (picture). But most of the time he was sitting through long conferences in hopes of swinging a barter deal between the Czechs and the Australians. If all goes well, the Australians will sell wheat to the Czechs; the Czechs will sell machines and other products to the Australians; and Gillon's company will take a nice profit as middleman.

Lamet is one of about a dozen British companies that handle trade with Communist nations within the restrictions of the West's strategic embargo rules. It is neither the biggest or the oldest in the business. But its operations are typical.

Lamet was organized four years ago when a British firm decided that the growth of Communist business justified setting up a separate company, and joined with a French trading company. Since then, Lamet has been selling, among other things, candy-wrapping machines and galvanized sheet to China in return for soya beans and bristles; tinplate, textiles, and machinery to Poland for rice sheds and steel; TV to Hungary in exchange for aluminum. The business can get complex: In one transaction Lamet bought wool from Australia, sold it to Bulgaria for wheat, shipped part of the wheat to Poland, purchased sugar from the Poles, and sold it to the Netherlands.

Lamet's business amounted to $11-million last year. About 90% came from East Europe, most of the rest from China. So far, Lamet has done no business with Russia.

By the time Lamet was in business, Russia had established trade missions or agencies abroad. All along, the Russians have preferred dealing directly with manufacturers overseas, instead of middlemen like Lamet. Besides, Lamet's specialty is barter. The East European countries, without the foreign exchange or gold resources of Russia, trade primarily through barter.

Even without Russian customers, Lamet finds plenty of room to expand its business. "We make a small profit on grains, a somewhat higher margin on engineering products," says Gillon. "Last year's profits were quite comfortable."

Lamet is the export agent in Britain for state-owned steel companies of Hungary, Poland, and Bulgaria. Its expansion has included part interest in a grain storage company, and recently a shipping company.

IN LONDON, headquarters of Lamet Co., Gillon (left) and an associate, G. R. A. Kwass, discuss Prague trip.

Lamet organizes its 20-man staff not by countries but by commodities. That's because export-import business in Communist countries is almost 100% nationalized, with one state company usually responsible for each commodity. Occasionally, Lamet clinches a deal right in its London office. Teletypes and telephone calls to and from Sofia, Prague, Warsaw, or Paris carry a lot of the daily workload. And on a typical day you might find Lamet entertaining Bulgarian trade officials in its board room—complete with brandy and cigars.

But more often than not, Lamet's 10 operating executives are traveling, talking face-to-face with their customers. They travel to keep up contacts. Yet the frequency of their trips points up one of the

IN PRAGUE, Gillon talks with head of Koospol, Czech grain trading company outside government office. Later . . .

. . . in conference, he discusses a wheat barter with women, who often hold key posts in Communist countries.

chief headaches of East-West trade —the complications of each contract.

"You may spend a month or two sitting around in an East European capital," explains Gillon. Travel is Lamet's major expense. The company would prefer paying permanent local agents, but the Communist countries say no.

Consider the travel—and patience—that went into a big contract Lamet concluded last November with Burma and Poland.

In 1953, the Burmese told a Lamet executive of their rice storage problems. In 1954, Lamet submitted an estimate for British-made sheds. But Burma had only rice to pay with, and Britain didn't want it. G. R. A. Kwass (picture, page 13) Lamet's Polish specialist, called Warsaw and asked a state organization if it would build sheds in return for rice.

Kwaas headed for Warsaw with an engineer. After explaining the proposal, he waited two weeks for a bid. Then he negotiated two more weeks. Finally, the Poles said they weren't interested in Burmese rice. On the way back to London, Kwaas —in Vienna—received a phone call: Come back, the deal is on. A month later, in Warsaw, Kwaas was ready to sign the contracts. But he discovered that while the Poles would build sheds, they still wouldn't take rice.

Three months later, Kwaas almost had the deal in hand. But no. There was disagreement over the price of the rice. Finally, last November, Kwaas finally concluded a $2.1-million barter. "Our most difficult contract," says Kwaas, pointing to a ledger showing $22,400 in expenses.

Besides patience, Lamet executives must have fluency in East European language. They must be equally at ease talking with high government officials or much lower-rank assistants. In Czechoslovakia, Lamet often negotiates with women, who hold top trading jobs.

Yet Gillon declares "Our transactions are like any other. There are no extraordinary risks." Lamet says once you get an obligation from a Communist state firm, it is all right; on the whole the firm's experience has been good. Sometimes Lamet takes a loss on a contract just to help its relations with a country. But when there's a solid contract, it's usually big—and Lamet's profit is big.

By acting as principal rather than as an agent, Lamet says it can gamble on bigger risks, make larger profits, settle damage claims and other problems quicker. The fact that it assumes legal responsibility for following through a deal appeals to Western customers. The company is considering opening a New York office; it is looking to future expansion of its small trade with China; and it may make a try at Moscow.

Joseph Gillon has some advice for trading firms who may be thinking about building up East-West trade: "You can't do it as a sideline. It's a fulltime business." ●

A Solomon's House for GM's Future

AMERICANS seem more than ever concerned with advancing technology; Talk about future materials, energy, engineers, and—to be sure—autos, runs high (page 5). A few weeks ago the nation was treated to much "future talk" when General Motors Corp. dedicated its huge Technical Center near Detroit.

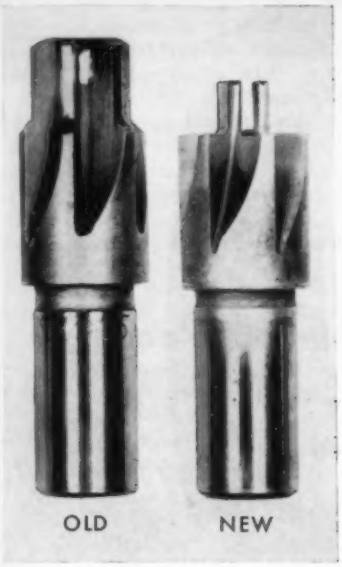
As befits the world's largest manufacturing company (1955 sales: $12.5-billion), the Center houses one of the world's greatest concentrations of brainpower —over 4,000 employees in all. "Physically and fiscally," wrote *Business Week*, "the place is spectacular." Twenty-five glass-walled buildings are grouped around a 22-acre artificial lake, amid 155 acres of lawn and 85 acres of auto parking fields. All buildings are air-conditioned; their end walls faced with colored glazed bricks. Inside, architects Eero Saarinen & Assoc. made lavish use of marble, chrome plate, stagy lighting. Cost: over $100-million.

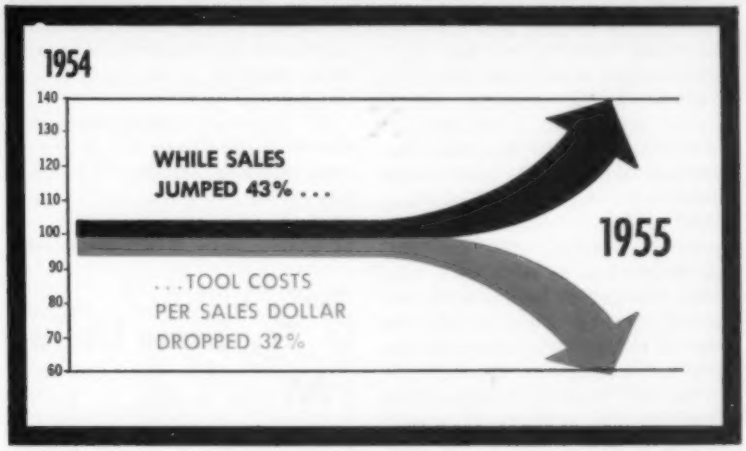
THE Technical Center is interested in far more than mere automobiles. It will serve as an engineering and development pool for all GM divisions. GM is going in for a lot of basic research and innovation; many believe it is so large in the field of motive power that it must look for new growth directions. GM's recent talk about nuclear energy, plus the background of the man GM hired to run the research establishment at the Technical Center, leads to speculation that GM is headed into electrical and power equipment.

The man in question is Dr. Lawrence R. Hafstad, a noted nuclear physicist. He is the first non-automotive man to hold a high position (as vice president) at GM; his Research Staff has nearly 1,500 employees. In the past GM research has been tied closely to applied science that has a direct, practical benefit to sales or cost cutting. GM has made significant contributions in metallurgy, combustion, fuels, plating, all forms of mechanical arts. But more and more, the nature of today's engineering problems demands deeper delving into basic sciences—and "pure" research.

"We are in the middle, or more likely in the beginning of a second industrial revolution," says Hafstad. One field of special interest to Hafstad is "materials and their uses." Not only are better metals and other materials needed for autos and familiar products, but the newer fields—like aeronautics and atomic energy — demand a "whole new category of materials." Hafstad is convinced that the world shouldn't worry too much about dwindling resources of conventional materials. Technology, he says, will provide substitutes.

CENTURIES ago, remarked *The New York Times*, Francis Bacon suggested that there should be a Solomon's House, a place into which scientific information would pour from many fields, to be digested and usefully applied. The Technical Center, says *The Times*, comes close to that conception, and is a national asset.





Redesign like this (left) has helped one company cut tooling costs while sales increased (above). Maybe you can use some of these ideas on how to . . .

Cut Costs With Smart Tooling

Digested from FACTORY MANAGEMENT & MAINTENANCE, May, p94

As mechanization spreads in a plant, tool costs tend to rise. But not so at Mueller Brass Co. (Port Huron, Mich.) Mueller has adopted a tooling policy that has tool costs headed down while sales move higher. MBC makes components for heating, plumbing, refrigeration and air conditioning assemblies.

Smart tooling means many things at MBC. The tool above is just one small example: an obsolete stem reamer made useful simply by regrinding.

MBC's program results in close control over quantities of tools in stock for standard production, tools made for special jobs, tool designs and specifications, and the use of tools on the production floor. MBC says it has reaped many benefits, including:

- Renewed sales of products for which MBC "rediscovered" inactive tooling.
- Savings up to $10,000 a year through conversion of obsolete tools.
- Better on-schedule production by the tool-making department.
- A cut of 20% in extrusion die costs by use of standardized die designs and materials.
- Less breakage, less downtime, and less machine bearing wear because of controlled tool dressing and changing.
- A saving of 500 engineering man-hours per year by using standardized design drawings.

Centralized control was the first main feature of MBC's over-all program. The company decided to combine all tooling facilities and functions under one manager—a tool supervisor in charge of tool design, tool making, tool supply and storage.

To consolidate all tooling activities, MBC even rearranged and moved some departments to a more central location to eliminate delays, cut transportation between departments, and reduce duplication of efforts and records. Tool control and records of all cribs were made uniform.

Next, MBC decided to improve communications between the new tool supervisor and the staff of line supervisors. To start, it sent a short questionnaire to each production man, asking (1) for a list of problems related to tooling, and (2) for a list of suggested solutions. The answers were "invaluable in improving tool servicing," says MBC, and helped give the tool supervisor the start he needed.

Paperwork was revised, too. New control forms were installed in all tool cribs. The system was designed to control tools from the date of original order until storage after use. Several manufacturers of paper forms and files were asked to study the proposed system, quote prices, and make suggestions.

These suggestions, too, helped get the program underway and eliminated a lot of costly trial-and-error.

Obsolete tools, piled high in MBC's cribs, were carefully surveyed. First, a list was made of all inactive tools. The standard-parts engineer studied the list for standard parts. Special tools were then referred to the sales department, which in turn checked with customers to see if the tools would be needed again. Finally, thousands of obsolete tools were removed from the cribs.

One unexpected benefit were some new orders that revived old "obsolete" tools. Customers responded when they learned that MBC still had tooling for goods

that had not been re-ordered for several years.

With minor changes, many obsolete tools became new tools for new jobs. Even if the tool itself was useless, MBC often found the tool blocks or holders usable. Yearly saving: about $10,000.

A tool schedule has been developed. With its new tool records section in one central location, MBC can easily check all tools as production orders come in. MBC no longer has to rush tools that were thought to be available but found missing when production was to begin. "We have crib records we can rely on," says MBC.

The tool-making department at MBC is able to meet its weekly schedules better than in the past. The tool schedule formerly ran about 50% below standard; only half the tools ordered were produced on time. Today, the compliance rate is up to 92%. This helps planned production, means fewer broken promises to customers.

The life of tools and dies has been recorded, too. By studying these simple records, MBC has been able to improve tool design, select better materials, and develop better heat-treating techniques. Brass extrusion-rod dies are an example. MBC studied their useful life, found wide variances among (1) dies made of different materials, (2) dies having different designs, and (3) dies of varying hardness.

Today, the company has "practically standardized" one die design and uses only a chrome-carbide type die material. Result: die cost per pound of extrusion has been cut 20%.

Tool redressing and regrinding according to a regular schedule is another cost-cutter, says MBC. The company puts "quality charts" at the machines—to measure quality of output. The charts show clearly when redressing and regrinding are needed. Excessive tool wear is avoided; the cost of restoring tools is cut down.

Combining tool changes also saves money. Whenever one tool on a machine unit is removed for redressing, MBC redresses other tools on the unit that have not quite reached that stage. Downtime of equipment is reduced.

Design changes are put in writing on a special paper form whenever a new tool is made. These forms are routed through the departments concerned for approval, then returned to the tool-and-die design department.

In any case, MBC does not change its tool and die drawings until there is actually a production order for parts to be made from the particular tools. It is not profitable, says MBC, to process many tool changes—that may never be used--simply on the basis of hoped-for or expected orders. With MBC's new system of scheduling tool-and-die design and making, this policy seldom causes serious delay.

Standardization of forms and procedures has led to some standard design drawings. Design time has been cut—reducing engineering hours by 500 a year, worth about $3,000 in wages. ●

Try Some United Nations Reading

Management men can find good reading in United Nations publications—either for the purpose of understanding the sweeping changes in world economics, or to find out more about particular commodities, regions, or trends in trade.

For a broad picture of world business there is nothing to equal the annual *World Economic Report*, analysing economic trends in a general way for different groups of nations. If you want more specific information, turn to the five annual regional reports. For example, the *Economic Survey of Asia & the Far East* contains a wealth of hard-to-find facts on the agriculture, industry, trade, payments, and development planning of the entire area. Don't forget the companion quarterly publication—*Economic Bulletin for Asia & the Far East*, which carries articles as well as statistics.

There is another economic survey for Latin America, and a brand new quarterly bulletin as well. Europe has its survey, of course. And note, too, *Economic Developments in the Middle East* and the *Review of Economic Activity in Africa.*

Along with these general, trend-spotting surveys, businessmen use U.N. documents dealing with more specific problems. A recent study called *Processes and Problems of Industrialization in Under-Developed Countries* is an excellent summary of knowledge gained so far about the intricate and inter-related problems that businessmen and governments face when a nation speeds up its industrial growth. Indeed, this should be required reading for anyone concerned with, and operating in, rapidly industrializing countries. An earlier study, *Methods of Financing Economic Development in Under-Developed Countries*, brings together many suggestions for finding capital.

For traders, there is much material—such as the *1955 Survey of Primary Commodity Markets*, with information on many raw materials moving in world trade. Wheat, tin, sugar, and coffee have their own annual reports, prepared by the coordinating committee for International Commodity Agreements. There is a *Survey of World Iron Resources.* There are two interesting studies of trade between Europe and Asia, and Europe and Latin America.

This is just a smattering of U.N. reading. You'll find a host of other documents—covering subjects like road transport, restrictive business practices, international taxation. A recent catalog—*Ten Years of United Nations Publications*—lists all documents by sphere of interest, and a monthly document index keeps the catalog up to date. For more information, get in touch with U.N. offices in your own country; or, better still, write directly to the headquarters library at this address: International Documents Service, Columbia University Press, 2960 Broadway, New York 27, N. Y. (Digested from Harvard Business Review, May-June, 1956).

How Many People Do You Manage?

Do you feel your time slipping away too fast — with things to do, people to see, either neglected or handled in a rush? If so, you may need to reorganize your "chain of command." Here is a principle to start with.

Digested from HARVARD BUSINESS REVIEW, May-June, p39

One of the biggest tasks confronting the modern manager is to cut down his workload to reasonable size. Premature heart attacks, all too frequent among middle-aged businessmen, are but one of many indications that executives are failing at this not-so-simple task.

And freeing one's self from a needless overload of work is not just a question of better health and greater personal efficiency. It is above all a question of more effective leadership.

The executive with a reasonable schedule of things to do—and people to see—has more time for reflection and creative thinking. He has more time for "informal" contacts throughout his organization—contacts which are the mainspring of leadership. He can give his employees, his customers, and his neighbors in the business community a bit more of the invaluable "personal touch." He is not saddled to his desk with routine duties and interviews—many of which could be handled as well, or better, by assistants.

Reorganization is usually the key. And that is where the "span of control" concept plays its part. It is no new idea—actually dates back to 1921. But it has caused much comment lately, and is gaining new importance as a management tool. The need today is great for work simplification—in the factory, on the sales force, in the general office, and especially in the executive's private office.

The span of control concept is simple: No superior can effectively supervise directly the work of more than five, or, at the most, six subordinates whose work interlocks.

If he tries to personally supervise more than six whose work is inter-related (as in many manufacturing businesses), he will be spreading his time and talent too thin among too many people. He will bog down into inefficiency. Here he is liable not to delegate enough authority.

If he is content to supervise, say, only three subordinates, he "over-delegates" and leaves himself with too few substantial duties.

In either extreme case, the executive is apt to be filling his time with too much petty detail; in one case because he cannot give really full attention to any single individual, and in the other because he spends too much time working with too few problems.

The span of control is not a rigid rule. Companies and industries vary; people vary. But it is a useful general principle and a valuable aid in cases where organizational weaknesses exist.

Some very strong human temptations to ignore the concept exist in modern business. For one thing, management attaches an exaggerated importance to "symbols of status." If a supervisor can report directly to the president instead of to an intermediate, he feels bigger, more important. Personal contact with the top man becomes an important symbol (equaled only, perhaps, by the supervisor's glassed-in-office, aloof from the rank-and-file).

Also, businessmen are cost conscious. There is sometimes pressure on management to avoid any reorganization that involves new appointments—new personnel on the payroll. The boss says to himself, "I can manage. There is not enough here to keep a sales analyst busy." But there is in many cases. The addition of a staff specialist would do a lot more than ease strain on the boss: It would give him more time for policy-making and other top-level jobs, and put sales research in the hands of a specialist where it belongs.

Finally, among the "human temptations" to ignore the span of control, is the top manager who cherishes a misleading conception of the "efficient executive." He sees his value measured by his "busyness." He feels that the number of subordinates reporting to him directly is an index of his stature—the more people, the higher status. And frequently he likes the sense of power and self-importance generated by a "queue on his doormat." Personal ambition overrides efficient organization.

The top executive, of course, is not always to blame for the confusion. It is hard for him as a person to resist pressure from his subordinates who insist on being directly accountable to him. This is especially true when the subordinates are talented, valuable employees. They may be creative men, whose new ideas need the personal attention of the boss if they are to be introduced successfully. Thus, morale and sentimentality are factors that sometimes have the chief's desk overloaded. He simply cannot refuse to deal personally with all the pleasant people who surround him.

The apparent dilemma between managerial efficiency—as predicated by the span of control limited to six subordinates—and democratic participation—where everyone in the office can go straight to the head man—is not really a valid conflict. Actually, in spite of sentimental factors, there is no greater stimulant of morale than an efficient organization, which in the long run makes everyone's job easier. And there is nothing which rots morale more quickly than poor organization, which creates the feeling that those in top authority do not know their own minds.

There is no condition which more quickly produces a sense of indecision among subordinates than their being responsible to a superior who has too wide a span of control (who tries to supervise

directly more than six people whose work "interlocks").

Actually, the problem of morale is, first, one of ignoring sentimental considerations and the feeling that the chief must be "democratic" and deal with all associates. Second, it is a question of giving the top executive time to be a "business leader." This means cutting down the span of control, and eliminating at least the overload of routine and specialized duties. Basically, of course, the idea is to limit executive duties by creating new departments or "divisions," new supervisors, new staff assistants.

One good way to reduce problems connected with a re-distribution of duties (to cut down the top executive's desk time) is to see that lower-level personnel develop maximum cross-relationships and communication. There are many duties and problems, thought to be in the president's sphere, that can be handled quickly and satisfactorily at the lower level, if the habit of cooperation is ingrained.

In cases where there is no interlocking of the work of subordinate units, there is less need to limit the top man's span of control, less need for subdividing the business. This can be demonstrated by a look at the giant retail chain, Sears, Roebuck & Co. (U. S. A.).

The chart of organization of Sears' purchasing department shows about 100 buyers reporting directly to one manager. However, a close look shows: (1) Each buyer buys a separate and distinct line of goods; there is no "interlocking." (2) The buyers have common problems; but for each of these, the manager has a staff assistant to deal directly with the buyers. Thus, since five people divide the supervisory job, the true span of control is nearer 20 than 100. (Not recommended, but not totally unreasonable).

In Britain, there is a case where the manager of a parent company personally (and successfully) controls 30 subsidiary companies. Thus, at least 30 chief executives report to him. There is no overloading of work, no conflict, because there is absolutely no relationship between the 30 companies except ownership. ●

Management—In Brief

Telling workers about "extra" benefits . . . "Salvage service" for employees . . . Profitable art show . . . Personnel plans for small firms.

Workers tend to forget extra benefits they receive, over and above regular wages. Vacations, free insurance, holidays, pensions, medical service, food—these and many others are too often ignored. The Republic Supply Co. (Los Angeles, California) decided to educate its workforce.

Republic mailed to each worker's home a letter explaining the extra benefits, signed by the company president. Enclosed was a simulated company check, made payable to the individual worker, and showing the exact value in cash of each benefit, and the total amount thus "paid" to him during the year. The payroll department made up the imitation checks, based on actual wages earned by each employee.

Does your plant dispose of scrap, salvage material, or "seconds?" If so, try this idea offered by Convair Division of General Dynamics Corp. (San Diego, California).

Convair employees have first choice in purchasing the plant's salvage materials. The salvage yard opens two days a week for employees to inspect and buy materials before the junkmen come in to bid. Small home owners and home-mechanics on the workforce take pleasure in finding great "bargains." They buy everything from used shipping crates to aged electric fans.

It is a small service and costs nothing extra. Yet this little privilege is appreciated by employees as evidence of management's consideration.

Artistic talent and business talent were blended recently to produce an effective technique in the realm of public relations. Brown & Root, Inc., a Texas engineering and construction firm, sponsored a modern art exhibit to promote good will throughout Central America. The show was held at Houston's Museum of Fine Arts. It featured the work of artists living in areas surrounding the Gulf of Mexico and the Caribbean Sea. The works of 137 artists from 12 Caribbean area countries, Puerto Rico, the British West Indies, and the U. S. A. were displayed.

Over 20,000 people attended. Response from Caribbean visitors was enthusiastic, and B & R reaped much favorable comment in the newspapers. For the company, the good will is valuable. It employs several thousand workers on projects in the area, worth millions of dollars to the company each year. And the art show cost only $15,000.

How applicable are present-day personnel practices to the small company? Some interesting light is thrown on the question by a recent study of personnel practices in 523 small plants conducted by Ohio State University (U.S.A.).

The personnel department as a separate unit does not begin to take shape, the study shows, until a company has at least 75 employees.

Beyond the 75-employee mark, the need for formal programs begins to be felt; and in companies with 150 to 300 employees, management usually plans personnel activities on a full-scale basis. Many companies in this category have formal programs covering: (1) financial services for employees (such as loan plans); (2) non-financial services (medical plans, etc); (3) research studies (such as opinion polls); and (4) well-defined programs for employee selection and training.

Digested from Industrial Distribution, Factory Management & Maintenance, Business Week, Personnel.

Ralph J. Cordiner, president of one of America's largest corporations, speaks from a college platform about "bigness" in business. In answer to critics — and there are many in the U.S.A. — Cordiner explains why huge companies are a boon, not an evil. And he tells the critics . . .

Why the Giants Will Stay and Grow

Digested from BUSINESS WEEK, May 12, p68

Big business in America—indeed, around the world—has been explaining itself to the public. One recent forum: a lecture series at Columbia University, New York. The principal speaker: Ralph J. Cordiner, president of General Electric Co. The audience: 500 students, teachers, and businessmen.

In a series of three lectures, Cordiner assumed the role of "defender of big business"—and explained why big companies exist and what role they play in the economy, how they can be managed effectively, and the problems they will face in the future.

The lectures, sponsored jointly by Columbia and the McKinley Foundation for Management Research, were the first of what will be an annual series to be delivered by leaders of big companies in the U. S. A. The idea, says the Dean of Columbia's Business College, is to give top industrial managers "an academic platform to expound their philosophies and techniques."

The Need for Bigness—Cordiner believes that the big corporation is not only a "natural phenoenon, but also one that the businessman is rapidly learning to handle effectively." He explains bigness this way:

"Whenever a society industrializes, one of the most important characteristics is a great increase in the scale of its undertakings. The drive toward complex technologies . . . toward mass production and mass distribution, necessarily results in the development of large-scale economic organization."

Whether you like it or not, says Cordiner, you cannot weigh modern ideas against those that prevailed half a century ago. As we "break through the ancient barriers of scarcity into an economy of abundance" we need to change our thinking. We need new institutions and new understanding.

Cordiner believes the large enterprise has three major roles to play. (1) innovation—to create new knowledge, new products, new markets; (2) mass production—to reach the masses of people with new and better products; and (3) advancement of technical capacity—to develop advanced ideas "that cannot be produced with limited resources in either men or facilities."

Managing Bigness—To Cordiner, the key word in management is organization. And the key concept of organization—practiced by Cordiner since he became head of GE in 1950—is "decentralization." Through decentralization of responsibility and authority, the character of GE's entire management procedure has been changed radically in the last five years.

In 1951, Cordiner began installing "decentralized management" throughout the company. Today, the basic job is done, he says, though the concept is one of constant change.

What GE has today is a three-part organization: the executive branch—the president, the board chairman, five executive vice presidents, and nine officers in charge of services; the service branch—specialists who serve the organization but have no operating authority; and finally, the operating branch—nearly 100 manufacturing departments, plus sales and service departments, all grouped into 21 operating divisions. All together, GE employs about 220,000 people, had gross sales over $3-billion in 1955.

Each of the more than 100 departments has a general manager responsible for what amounts to a separate business. He has almost full responsibility and authority. He reports to a division manager, who is usually a vice-president and whose main job is long-range planning for the division. What this really is, Cordiner explains, is a corporate entity made up of 100 or more businessmen. Over-all expansion is accomplished, not by buying up smaller companies, but by internal growth and development.

The future of bigness poses a great challenge, says GE's president. Human values and political and social values must be understood by management, as well as efficiency. There was not such doubt left in the minds of Cordiner's audience that the "big businessmen" are determined to find solutions to the problems of "bigness." ●

President's Puzzle: the Paperwork Piles Higher

Digested from BUSINESS WEEK, May 5, p95

Are you sky-high with papers, like this company president?

Or neat, like this rare manager?

Do reports pile high on your desk? Do you sometimes feel that you are becoming more of a report reader, and less of an active administrator?

If so, you are like thousands of businessmen who wage a constant battle to keep up with the paperwork that finds its way to their desks each week. Few executives have been able to clear their offices of all but the most essential reports. The executive in the cartoon below is a rarity.

A survey of company presidents around the U.S.A. was made recently by *Business Week* reporters. Presidents interviewed admitted that they lean heavily on reports. Despite the multitude of documents they receive, most of the chief executives feel that reports are vital—and here to stay. But they see two big faults:

- Too many reports—covering everything from refinancing to details of the employees' picnic.
- Poor quality—in spite of high cost of report-making.

The debate among the presidents is over just how much detail, how many figures, should go into a report. One utility company executive, for example, thrives on detail. He gets 40 to 50 reports a month, all crammed with figures. He refuses to accept outline reports or graphs.

Wayne Johnson, head of Illinois Central Railroad, says he cannot function without plenty of facts in his reports. He dislikes having to call in specialists to give further details. And he wants written reports—no oral communications—in spite of an over-heavy workload of paperwork.

The other extreme is represented by D. R. Berlin, head of Vertol Aircraft Corp.—a helicopter manufacturer. He refuses to deal with written reports of any kind, and counts on face-to-face interviews and weekly staff meetings. He is backed up, among others, by James Carmichael, president of Scripto, Inc. (pencils, pens). Carmichael will tolerate only a few technical reports—but brief, without detail.

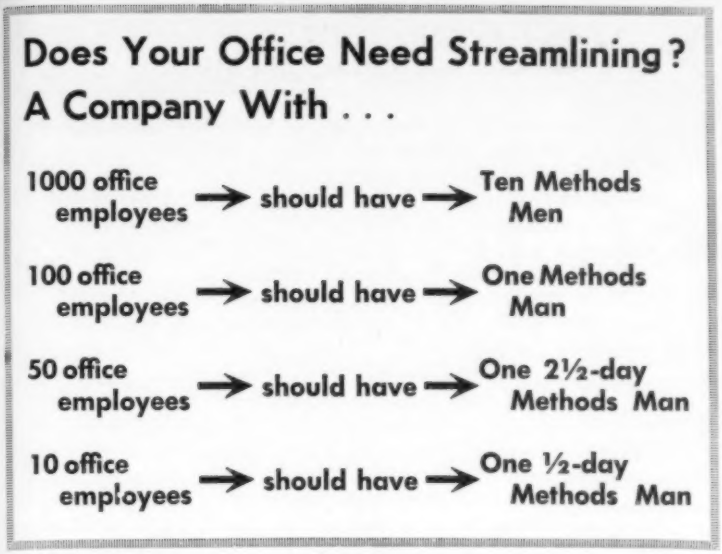
Another point of disagreement among executives is this: How far can you use a man's reports as a standard for judging him? Some company presidents give reports a lot of weight. One executive says, "A clear, concise report means a clear concise thinker." But others say it is dangerous to judge, say, a warehouse manager, by the quality of his written reports. A smart assistant (or even his secretary) may be doing the writing.

How to improve the report system? Presidents are nearly all working on this—with generally poor results, so far. One way to improve quality (if not the number), many executives feel, is to put a strict limit on the length of reports. One group aims at a standard one-page report.

A more common view is that of Frank Prior, president of Standard Oil of Indiana. He wants reports complete enough to be reviewed without supporting documents—but still brief as possible. He also wants the highlights of a report summarized in a page or two, in front of supporting details. The head of another concern follows a similar idea. He gets technical reports divided into two parts—first a summary in simple, non-technical language, then a section of technical details to support the summary.

Screening can be a big help, too. In one major company, the president gets only reports on unusual conditions. Routine information reports are screened out and handled by assistants. In many cases, an assistant to the president—maybe a vice president—goes over all reports, picks out trivia, and decides what should go to the top man. The assistant is, himself, in a key position.

One final suggestion: Hire a management consultant from outside the company. One concern, at first skeptical, did this—and in two years cut its executives' paperwork by 35%.●


Does Your Office Need Streamlining?
A Company With . . .
1000 office employees → should have → Ten Methods Men
100 office employees → should have → One Methods Man
50 office employees → should have → One 2½-day Methods Man
10 office employees → should have → One ½-day Methods Man

For Office Efficiency Appoint a Methods Man

Digested from AMERICAN BUSINESS, Apr, p32

A "methods" department, working to improve office operations, is usually regarded by the small businessman as a luxury to be enjoyed only by very large companies—like Imperial Chemical Industries, or Daiichi Bussan Kaisha, or U. S. Steel Corporation.

This is not true. The small concern can in most cases afford a "methods man," and usually needs one as much as does the giant organization.

A common rule for a large office is that one full-time methods man is needed for every 100 clerical employees. Thus, an office with just 20 people should have somebody spending a fifth of his time on methods work—say, one day a week; an office with 10 people needs a methods man half a day a week (or perhaps one hour a day); and so on.

The effort is well worth while for any company, big or small. Steinberg's Limited, the Montreal retail chain, has found seven good reasons for applying "methods" to its small office force:

• The trend these days is toward expansion of office work—especially the use of complex reports. There are always new clerical jobs that need doing, but must be postponed "until there is more time." Actually, the only practical way to find more time is to find quicker ways of doing the old jobs.

• If the work can be done faster, then it can be checked more carefully for quality and accuracy.

• In the small office, the supervisor usually spends part of his time on routine chores. If shortcuts can be found, he can be relieved of much routine. He can then concentrate on planning and supervising.

• In a growing business, a number of small short cuts, added up, will delay the time when extra staff must be added. (In a declining business, staff can be reduced more readily if new short-cut methods are discovered).

• If office jobs can be done faster, then new reports and statistics can be "rushed" if necessary, usually without having clerks work overtime.

• Morale is improved when the staff realizes that management is determined to use more efficient methods. Old-fashioned methods that encumber the business—even though they make the employee's job somewhat easier—seldom inspire confidence and full cooperation.

• The role of "methods man" is an excellent training ground for the young executive.

What about the office manager? Should he be given the job of streamlining his own department? Steinberg's says "No." The "line" manager's first responsibility is to turn out a great volume of work, on time, and in good form. Methods work, even if only one day a week, would seriously interfere with the regular routine. Furthermore, the average office manager concentrates heavily on his own department—he seldom looks beyond. The methods man, however, must have imagination and a fairly wide range of experience. He must know how reports are used when they leave the office—something the office manager tends to ignore.

The company-wide methods man has another advantage. He picks up techniques for finding short cuts by working in all departments. Even though only a part-time specialist, he may have worked on efficiency problems in, say, the shipping department records section. This experience would help him solve parallel problems in the main office.

Jobs done by the methods man vary from company to company. Generally, though, you can expect these results:

• **First, forms control.** Forms are the raw material of office work. The methods man may pay the company handsomely by working with forms for only a few minutes each day. The key to savings is this: no printing or duplicating of forms without his approval. He can usually cut out the overlapping of some forms, and can often eliminate others entirely. When a form is dropped, the printing charge is avoided, plus the labor of using the form, worth at least 20 times the printing charge.

• **The methods man's second field** is the systematic review of methods in search of short cuts. He should concentrate on the greatest chances for savings. These may be areas that are apparently causing no trouble—no obvious trouble like a bad paperwork bottleneck. For example, a payroll system may operate smoothly by writing pay checks, earnings records, tax records, and payroll journals sepa-

rately. But however smooth the operation, there will be big savings in labor if all four records are written at the same time, by one clerk, on one machine.

Every routine office job, says Steinberg's, should be covered by the methods man at least once every five years. Copying of records "can almost always be eliminated by one device or another." Repetitive operations can usually be mechanized—and mechanization is not restricted to large offices. Frequently the small office can profit from fairly inexpensive mechanization. For example:

If a bookkeeping machine is too expensive and will not pay for itself in a reasonable time, then a wide-carriage adding machine (smaller and much cheaper) will bring at least some of the benefits of mechanization. Failing that, a front-feed typewriter (still smaller and cheaper) will allow several different forms to be filled at the same time, like a bookkeeping machine, though it will not do the calculating.

• **His third job is to help the "line" staff** get new operations installed and running smoothly. The new job routines should be written out for the staff, in clear, simple terms. Elaborate office manuals are not needed, but each line operator should have, at least, a loose-leaf binder to contain typed routines that apply to his particular job.

• **Finally, the time saved must be put to good use.** He does this by setting job standards, similar to "time-study" standards in a factory. Output-per-hour for each job must be determined. It means little to speed a process and have the operator on idle time. Making comparisons with average output in the past is a poor method. Comparison with similar operations in other companies is better.

Let your methods man roam a bit—outside the company. He should get to know methods in other companies, should attend management meetings, read methods literature, and keep abreast of new office equipment ideas. But remember: new methods need not mean new equipment. The only sure requirements are planning and imagination. ●

▶ YOU AND YOUR PERSONAL AFFAIRS

The overworked businessman is becoming increasingly liable to serious occupational illness. In Britain and the U.S.A. the disease of mental and physical overstrain—that goes with executive responsibility—often shows up in nervous stomachs, or "ulcers." The Germans call it "Managerkrankheit." In every land it has its name and its victims. In any case, it amounts to one form or another of "battle neurosis." The cure: at least a month's holiday with compulsory golf, or in some advanced cases, a series of sessions on the psychiatrist's couch.

Extensive overseas travel, if for the sake of business, is no cure for the ills and pains of office duty at home. The strain is there—very much so, says J. J. O'Dwyer, Unilever Ltd.'s chief medical officer. He warns against going abroad to capture some elusive export business, for example, and thinking that the six-week trip can be counted as vacation. **There may often be an added strain,** involving a physical adjustment to a new climate and diet—not to mention late hours, over-eating or drinking, and the chance of picking up minor ailments in far-off places. **Come back from abroad by ship,** says O'Dwyer—and rest on the way.

✦ ✦ ✦

If you are traveling to a strange climate in the next few months, take a medical kit along. It may turn out to be as valuable as your passport, especially if you visit the tropics. The kit should contain a thermometer, aspirin, anti-motion pills, bismuth salts or kaolin, antihistaminic inhaler or nose drops, insecticide spray bomb, soap, toilet tissue, cleansing tissue—and the phone number of your doctor at home.

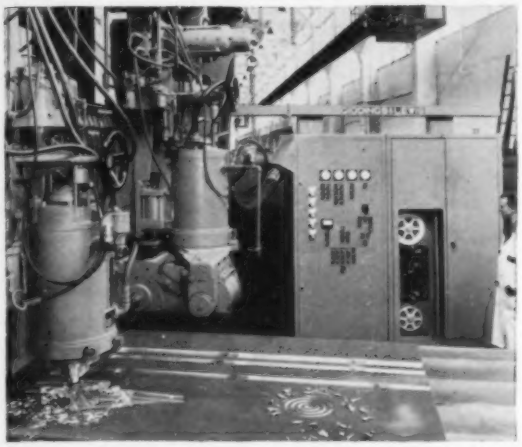
If antibiotics or vitamins are recommended by your doctor, be sure to carry a goodly supply for the trip. If you have any special health problem—such as allergy to sulfa drugs, or a disease like diabetes—be sure to get a written notation from your regular doctor to that effect. **Rule of thumb while away:** If an illness involves a fever, or lasts more than 24 hours—call a local physician. (But note that intestinal upsets from strange food and water last up to 48 hours.

✦ ✦ ✦

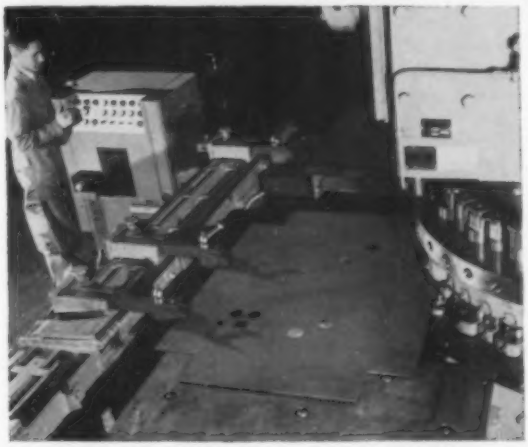
About the safest way for a traveler to be sure of having a large sum of money available is through a "letter of credit" from his bank. Unlike travelers checks, forgery is almost impossible. The letter allows you to sign "sight drafts" drawn on your bank up to a specified limit. With a "circular" letter of credit, any foreign bank that regularly does business with yours will honor your draft. With a "special" letter of credit, you are limited to a particular bank abroad.

And speaking of efficiency and conveniences for the traveler, one bright insurance man got the idea of **a consolation prize for the tourist whose vacation is spoiled by rain.** This year, vacation "rain insurance" is available in the U.S.A. for the first time. Fireman's Fund Insurance Group offers insurance covering 100 popular resort areas throughout the nation. If your trip is spoiled by "excessive rainfall," you get paid. Coverage is sold in amounts up to $300 per week for 14, 21, or 28 days. Charge is 5%. (But to get a 100% pay-off, it would have to rain 10 days out of 14! For five days' rain, you collect just 10%).

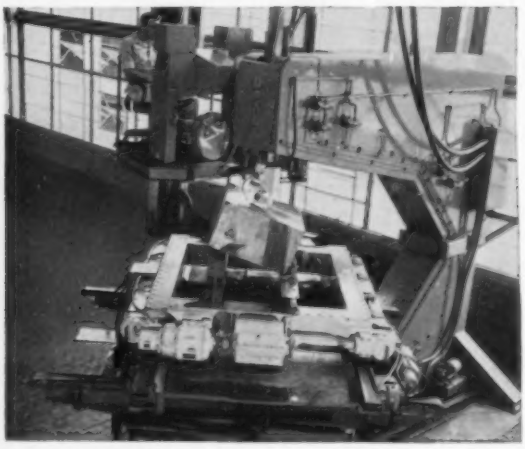
YOU has been compiled from The Economist (London), Business Week, Factory Management & Maintenance, and other sources.



Milling by Tape



Punching by Card



Sawing by Wheel

Turning by Plugboard

Metalworking Turns to Electronics

Digested from ELECTRONICS, Special Report; CONTROL ENGINEERING, Special Report; METALWORKING PRODUCTION

Electronically controlled machine tools form one of the newest concepts in automation—and will surely affect the metalworking shop of the future. In even the multi-purpose machine tool, flexibility is limited.

Conventional tool types will continue to be important. But, now, electronics gives the word "flexible" real meaning. Systems have been designed that can guide a machine through a long and elaborate series of operations. Shapes that at one time could be produced only on hand-controlled machines now are machined automatically—and more accurately.

But managers, production people, and many engineers are still waiting for these devices to prove themselves in the tough school of economics. Meanwhile, it may pay you to keep up to date, because experience, simpler controls, and other factors are bound to reduce costs—and probably your costs—in years to come.

Basically, electronic systems move the tool or work table in one, two, or three dimensions to cut the desired shape. The systems act as supervisors that interpret information and give orders.

This simplest form of control is in the single-dimensional machine where a plugboard sets spindle speeds and feed rates. In lathe operations (picture, bottom right) where a symmetrical piece is being turned, tracer or magnetic-tape control changes the position of the cutter.

Milling machines, for cutting complex forms, require information to raise or lower the cutting tool as well as to move the table in two directions. Rectangular coordinate data can be processed in a computer to provide a step-by-step or continuous tool motion. Tracer-controlled milling machines use deflection of a stylus on a three-dimensional model to pro-

vide control information to the cutting head.

The electronically controlled Gidding & Lewis milling machine (top left preceding page) uses engineering drawings as the original source of information. The drawings are converted into tables of decimal increments for transfer to punched paper tape. A numerical director processes the information on the tape. Essentially, the director takes the increments and converts them into continuous data suitable for controlling the various machine motions. These signals are recorded on magnetic tape that directly instructs the machine.

The DoALL band-saw (top right, preceding page) combines operator control with electronics. The saw cuts complex extrusion dies for aluminum. Three separate feed motions machine a curved surface with the saw blade. The work rotates and moves in straight lines in rectangularly coordinated directions. Two tables provide the straight-line motion; both are mounted on a rotary table. The saw is centered on the rotary table.

Sawing a straight line requires movement of only the linear feeds while cutting a curved surface requires simultaneous operation of all three feeds. But the linear feeds have to be kept synchronized with the rotary table. Every time the table turns it changes the direction of the saw's cut. This is where electronics comes in. All three feed drives are simultaneously controlled from a single wheel by a combination of a positioning-control system for the rotary table and a speed control for the linear motions.

Positioning a workpiece under a drill or punch requires control of table motion in two coordinates. In the General Electric punchcard positioner (bottom left, preceding page), position information in rectangular coordinates is recorded on punched cards. An electro-mechanical system, instructed by the cards, positions the table.

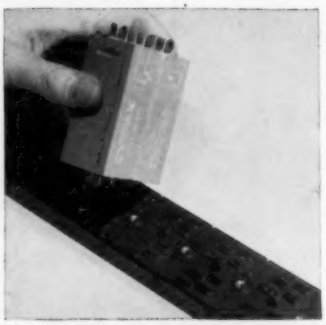
Ferranti Ltd. (England) has developed a three-dimensional control for machine tools. The four essentials of the system are an electronic computer, a control unit for the machine tool, high-performance control mechanisms and an electro-optical measuring system inherently more accurate than the machine tool.

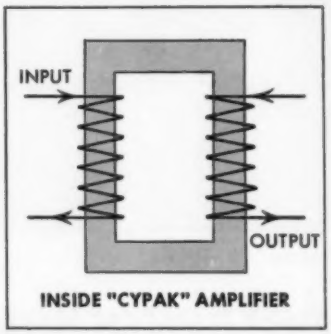
The computer, which costs $85,000 or more, is the major item. Its function is to convert working drawings of the part to be machined into a program of instructions. Ferranti proposes to offset the computer's high cost by setting up a service center where businessmen can hire the machine by the hour. (MD, Apr.) As a result this type of machine-tool control will be made available to a wide section of metalworking. It is expected that the cost of computer programming from customers' drawings will compare favorably with the cost of preparing ordinary operation sheets. But, as yet, figures are not fixed.

The French, too, are active in electronic controls for machine tools. Societe Anonyme des Anciens Etablissements Charles Berthiez has a vertical lathe operated by an electronic contouring system. The system's designers, Societe d'Electronique et d'Automatisme, call it Duplicatron. Movements of a stylus traveling over a template are converted into electronic impulses that direct movement of the cutting tool. One thing the French point out is this: Machine design and control design must be coordinated if the two are to function together as an efficient system.

Before these and similar machines become commonplace in metal-working, two objectives will have to be met. (1) they must do the job satisfactory, and (2) they must do it cheaply.

The big problem remains cost. Discounting development costs, a complex control system may account for one-half or more of the total price of the complete machine tool. This may be good or bad, depending on the comparative cost of the items produced. More operating experience and development work undoubtedly will reduce costs.●



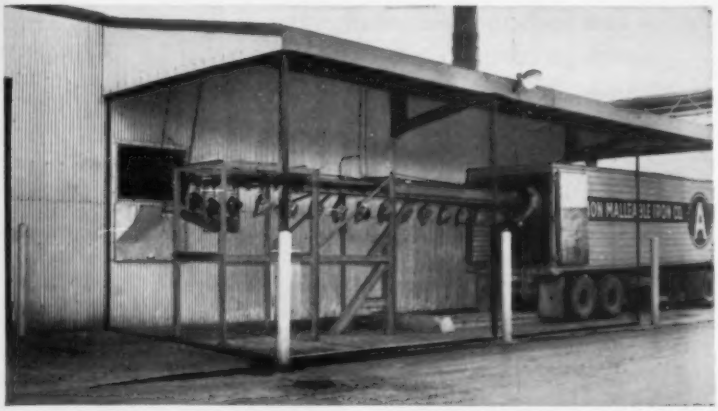


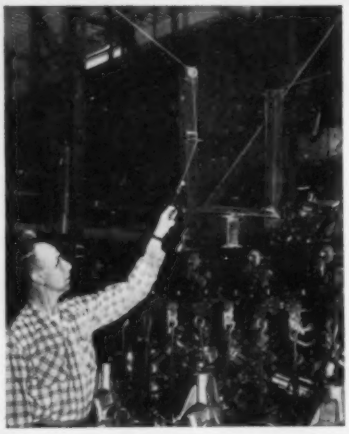
INSIDE "CYPAK" AMPLIFIER

No Moving Parts in this Control

The compact plug-in magnetic amplifier in the picture, and the plastic wiring strip that it plugs into, are the basic building blocks for one of the newest advances in industrial controls. The units are the outgrowth of the Cypak controls that Westinghouse Electric Corp. introduced last year. Their job is to regulate the machines of an automatic production line. Usually they are expected to supplement conventional relays, or to take over their function.

What makes them exciting is the fact that they have no moving parts or parts that can wear —as compared with relays or vacuum tubes in a conventional control system. Westinghouse says they are more expensive than an equivalent relay control system. But while the initial cost is greater, long life and strong service features of the new Cypak system could make its use pay off in a surprisingly short time.—Digested from BUSINESS WEEK, May 5, p184.





1 PROBLEM: Relieve congestion on loading platform. SOLUTION: Run conveyor into truck. Load conveyor with product (top). Trip mechanism (bottom left) automatically drops product into bins by type (bottom right).

2 PROBLEM: Product crating interferes with production. SOLUTION: Centralize crating.

Conveyors Simplify Plant Operations

Digested from FACTORY MANAGEMENT & MAINTENANCE, May, p110; p120

Need more space on your loading platform? Is product crating interfering with your production lines? A little thinking about these problems in terms of materials handling will point up solutions. Let's take them one at a time.

A conveyor system could relieve the congestion of the loading platform. Here's what Dana Corp.'s Fort Wayne (Indiana) Div. does:

Two conveyor belts carry forgings (housings for auto and truck differentials) from inside delivery trucks to in-plant storage. The conveyors also segregate different types of housings in 32 different bins.

Each of the two identical conveyors supplies a different group of 16 storage bins. Boom-like conveyor supports permit trucks to back up, so that conveyors jut into the truck body. With the truck in position, a worker then hangs forgings on the conveyor hooks as they pass by. As the truck is unloaded, it is backed up so that the conveyor extends farther inside. Thus unloaders save steps.

Forged housings for various differential models are segregated in individual bins. But Dana also segregates by supplier, to keep a close check on quality. This is not much of a problem because each delivery by truck is limited to forgings from one supplier or for one differential model.

To route forgings to the desired bin, the receiving-department foreman sets a conveyor-hook tripping mechanism over the bins. As hooks strike the tripper they are tilted, thus dropping forgings into the bin.

One way to lick the crating problem is to bring your product via a conveyor to a central crating area. This is what Airtemp Div. of Chrysler Corp. (Dayton, Ohio) has done.

Airtemp installed automatic conveyors to bring assembled air conditioners from remote manufacturing areas to a central crating area near the warehouse and shipping platform. These were the results:

- No delays in flow of work to

packers. Formerly, packers at the end of an individual assembly line sometimes stood idle while the product was being changed.

• More manufacturing space. Crating area was converted to production.

• Centralized crating materials. Formerly materials were stored in four different areas.

• Less truck traffic in production areas. Traffic now confined to the centralized crating area. Before, trucks operated throughout the plant.

Conveyors link two main manufacturing areas with central crating, servicing five assembly lines. Photoelectric cells and motors control the individual conveyor sections. The photoelectric cells divert air conditioners onto three crating lines—according to model. Later, fork trucks remove the crates from the ends of the crating lines and deliver them to warehouse areas. ●

Management's Job

When you stop to think about a manufacturing operation, you find a large part of the process is taken up by moving materials from one place to another. If you look at costs, materials-handling eats up 25% to 60% of total manufacturing labor costs. The point is this: Materials handling offers about the best approach for reducing cost, and increasing productivity.

But to make the most of this opportunity, management will have to stay constantly alert to new ideas for mechanizing handling, keep a careful watch on the equipment manufacturers. The range of their products is constantly expanding and finding new applications.

This was made abundantly clear at two recent materials-handling exhibitions—in the U. S. A. and Britain. For a look at what manufacturers on both sides of the Atlantic have to offer, see PRODUCT DIGEST on another page in this issue. —The Editors

Looking Ahead in Production

A spur for bagasse . . . Teflon bearings . . . synthetic diamonds go commercial . . . Russian success with controlled fusion . . . heat-resistant polyethylene fiber.

A loan from the U. S. government's Export-Import Bank will spur use of bagasse (sugar-cane waste) as an industrial raw material in Cuba. A $1.5-million credit went to Compania Cubana Primadera to help pay the cost of a plant that will produce hardboard, tileboard, and decorative board. Markets are expected to lie in Cuba and the Caribbean area.

Bagasse is normally burned for its fuel value in sugar mills. Separation of the pith from the bagasse fibers makes possible high-tensile strength board without synthetic binders.

Add new uses for Teflon, Du Pont's tetrafluorethylene plastic. Du Pont and American Metal Products Co. (Detroit) have joined hands to develop an autobile suspension joint that eliminates the need for conventional lubrication. The development points the way toward Teflon's use in other types of bearings.

Teflon fiber is double-woven with a backing of nylon or cotton. This fabric is then laminated with cotton-reinforced phenolic resin and formed into a ball-and-socket bearing. Teflon's self-lubricating property and slick surface cuts friction 50% compared with conventional ball-joint suspension systems.

Those industrial diamonds that General Electric Co. began "manufacturing" in the laboratory last year are now in pilot-plant production, and GE thinks it is close to commercial scale output. When that gap is bridged, the U. S. may be freed from dependence on South Africa for the tiny diamonds needed for cutting tools, abrasives, and polish slurry.

A lecture in London by a Soviet nuclear physicist may have far-reaching impact on thermonuclear technology. Russia's Igor Kurchatov revealed that Soviet attempts to generate controlled energy by fusion of deuterium (double-weight isotope of hydrogen) have nearly succeeded.

Top United Kingdom atomic experts regard it as the most important public statement yet made on controlled thermonuclear reactions. In the U. S. much of the data Kurchatov disclosed would be considered top secret. Washington's immediate reaction was this: The Senate was urged by some of its members to push for an expanded government reactor-building program. Some Senators also condemned the tight security restrictions on U. S. information. As yet no definite action has been taken.

Temperature resistance is the noteworthy feature about a new polyethylene fiber. Still in the experimental stage, it is being investigated by Courtaulds Ltd. in England. The material (Courlene-3) is made of polyethylene monofilament. But its softening point, says Courtaulds, is 248°F.—or 86°F. above other polyethylene-base fibers. According to Courtaulds, the product is just about as strong as the polyamides (nylon) and comparable to them in abrasion resistance.

Calcium carbide and other products now made by electrothermal methods may some day declare their independence from electric power. Cheap tonnage oxygen is the key.

A big step in this potential revolution is taking place now in Germany, where Badische Anilin & Soda-Fabrik has reached a scale of 70 tons/day with an experimental oxythermal calcium carbide unit at Ludwigshafen. Coke and lime are charged to a graphite-lined shaft furnace, oxygen reacts with part of the coke to form carbon monoxide and provide the necessary high temperature. Calcium carbide is tapped off.

Digested from, Business Week, Chemical Week, Electrical World, and other sources.

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. . . miles of pipe **The operator of this Clark-built MICHIGAN truck crane can place a 20-ton load precisely where he wants it, simply with a flick of the wrist on the operating levers.**

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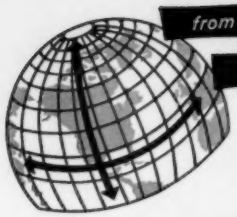

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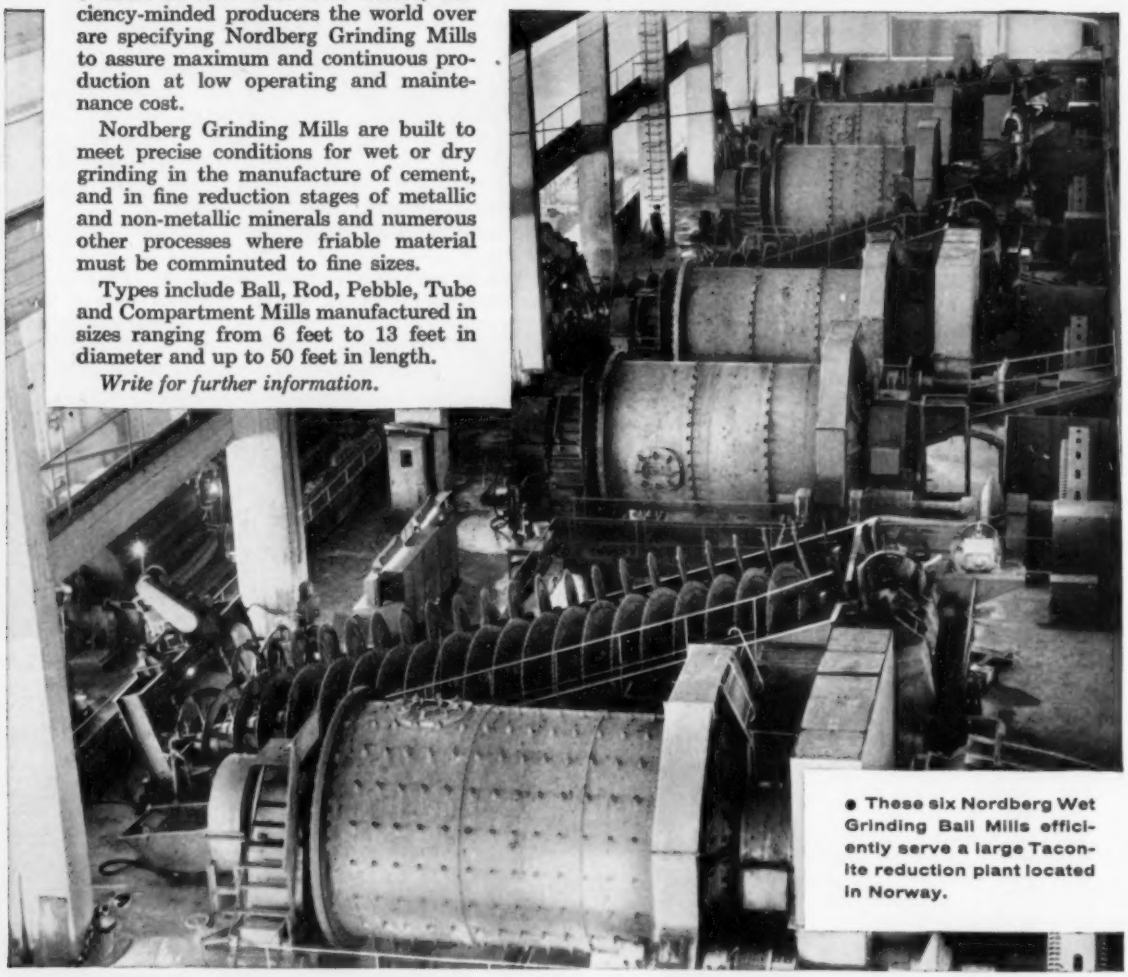

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Growing Market for Plastic Pipe

Plastics have long since outgrown the label "substitute materials." Now they are full-fledged construction materials in their own right. In pipe, for example, plastics sometimes perform better than metal; and new piping applications are continually appearing, as are new plastics. Here is where plastic pipes stand, today, and what you can expect of them in the future.

—The Editors

Digested from THE WALL STREET JOURNAL, May 8

INDUSTRIAL consumers are turning increasingly to plastic pipe for meeting specialized needs. The H. J. Heinz Co., for example, uses it to carry vinegar in its bottling operations. Dixie Cup Co. shoots paper cups from the machines that manufacture them to the packing room through transparent plastic tubing. Coal mines have converted completely to plastic for draining corrosive liquids, and oil-well gathering lines put it to steady use.

Eli Lilly & Co., Indianapolis pharmaceutical maker, uses rigid PVC (polyvinyl chloride) vacuum lines for vessels employed in precipitating ether, replacing carbon steel piping. The inert and nontoxic plastic also is used for drainage systems for handling spent hydrochloric, sulfuric and other mineral acids. The carbon steel piping that had been used could not safely handle these corrosives for longer than eight months. The plastic is expected to last indefinitely.

A farmers' cooperative in Texas has just installed a 98-mile plastic pipeline, claimed to be the longest of its type in the U. S. A., to furnish natural gas for 200 small irrigation pump engines. Republic Steel Corp. made the tough, rigid pipe from Kralastic, a rubber-plastic blend made by U. S. Rubber Co. The entire 98-mile line, buried three feet underground, was installed in 31 working days.

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plastic pipe in these fields, the present predominant use of the tubing is on the cold water front in connection with jet pumps, farm water systems and the familiar household garden hose.

High-gear research work in the plastics industry has been underway for some time in efforts to reduce the pipe's two disadvantages that must be overcome before the industry can enter the big home hot water field. The material now in use becomes "soft" under high temperature, and is weak under high pressure.

Ordinary flexible polyethylene, which outranks other plastics on a volume basis, softens well below the boiling point of water, which is 212°F. By lifting the softening point to about 240°F., plastic people say it will be possible to use "poly" in the hot water systems of building and homes.

More expensive forms of plastic, like rigid pipes made of butyrate, styrene copolymers and vinyl plastics, stand up better than "poly" against high temperature and pressure, although any of the plastics now in use is cheaper than costly copper tubing, widely used in home plumbing.

One new plastic is a special polyethylene resin produced under low atmospheric pressure, which results in an almost-rigid pipe. This compares with ordinary "poly" produced under high pressure, resulting in a flexible pipe. The big difference: The low-pressure "poly" is claimed to be able to keep its shape in temperatures up to 250°F. and has a burst strength almost three times that of high-pressure "poly."

Koppers Co., Inc., a plastics resins producer, already is in semi-commercial production of the new low-pressure material, which it calls "super dylan polyethylene." Hercules Powder Co. and Phillips Petroleum Co. are in the same plant-building race, and several other important producers are expected to join.

Monsanto Chemical Co. sees household piping as having "the greatest replacement potential of metal pipe by plastic." Monsanto estimates the actual potential will likely be around 75-million pounds per year, or 15% of the standard steel pipe market. ●

ICI's Titanium Process: It's Different, Costs Less

Digested from THE ECONOMIST (LONDON), Apr 28, p399; May 5, p490

In 1951, Britain's Imperial Chemical Industries Ltd. began to study one of the textbook methods of producing titanium metal—a method nobody else believed could be used outside the laboratory. Earlier this year, ICI began to offer crude "granulated" titanium from its Wilton plant. ICI's process, no longer a laboratory tool, is reduction of titanium from its tetrachloride with sodium metal.

(Since ICI's announcement, an American company, Electro Metallurgical Div. of Union Carbide & Carbon Corp. has put into production a titanium plant using the sodium-reduction process. Price-wise, ICI's titanium sponge is cheaper than U. S. sponge—$2.95 as against $3.25 per pound).

Until now, titanium makers have universally adopted the Kroll process. It involves the chlorination of titanium ore and the reaction of the tetrachloride thus produced with magnesium metal, to give titanium metal plus magnesium chloride.

The Wilton plant buys titanium tetrachloride from Titanium Intermediates Ltd. Sodium comes from ICI's General Chemicals Div. The main reaction consists of the addition of titanium tetrachloride to molten sodium under an inert gas "blanket" in an oil-fired furnace. At the end of the reaction, the titanium is left as a spongy mass embedded in solidified salt. Getting this out of the reactor requires much less work than the same job in the Kroll process.

The main cost advantages of the sodium process come in separating the titanium from the salt. The mixed reaction product is fed into leaching tanks, where the salt is simply dissolved and washed away, leaving the titanium for drying and packing as a granulated powder. In the Kroll process part of the magnesium chloride is usually recovered by "trapping" it in molten form; the remainder is generally removed by an expensive high vacuum process.

ICI has still another unique feature in its titanium scheme. Other producers shape titanium on ordinary rolling mills; ICI is building a plant exclusively for rolling titanium. It may be the first plant of its kind in the world.

Meanwhile, ICI is giving a long look at markets for its metal. It got into the titanium business mostly under government pressure to make the metal for military uses, especially aircraft. ICI hopes for a far greater return on its investment from other markets. In fact the company's commercial effort this year is devoted to promoting uses other than aircraft.

ICI's thinking along new market lines has turned up an important possibility: Parts of a chemical plant might benefit from titanium's excellent resistance to corrosion. Other possibilities take advantage of titanium's strength-weight ratio at medium temperatures. The blades for the low-pressure end of steam turbines are one example; the fact that the metal's lower weight would cut centrifugal stresses is a decided advantage.

ICI is convinced that some uses must be found for the metal's properties when exposed to seawater. Titanium's resistance to extreme conditions of corrosion in salt-water is far superior to conventional condenser tube alloys; and, incredibly, titanium appears to be even better in seawater than in air.

But any development of titanium uses outside defense is likely to depend, much more than defense does, upon price (MD, April, 1956). What are the chances of cheaper titanium? For one thing, titanium's price has come a long way since 1953 when it was $4 to $5 a pound. In the U. S. A., hopeful estimates suggest perhaps $1.15 a pound as the price for raw titanium (MD, June, 1955) when the industry eventually reaches a massive "maturity." Should this come to pass, there will be no question about a broad market for titanium. ●

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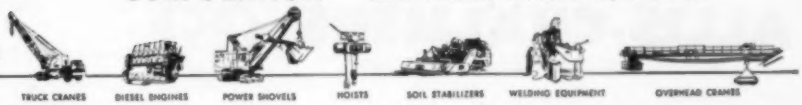

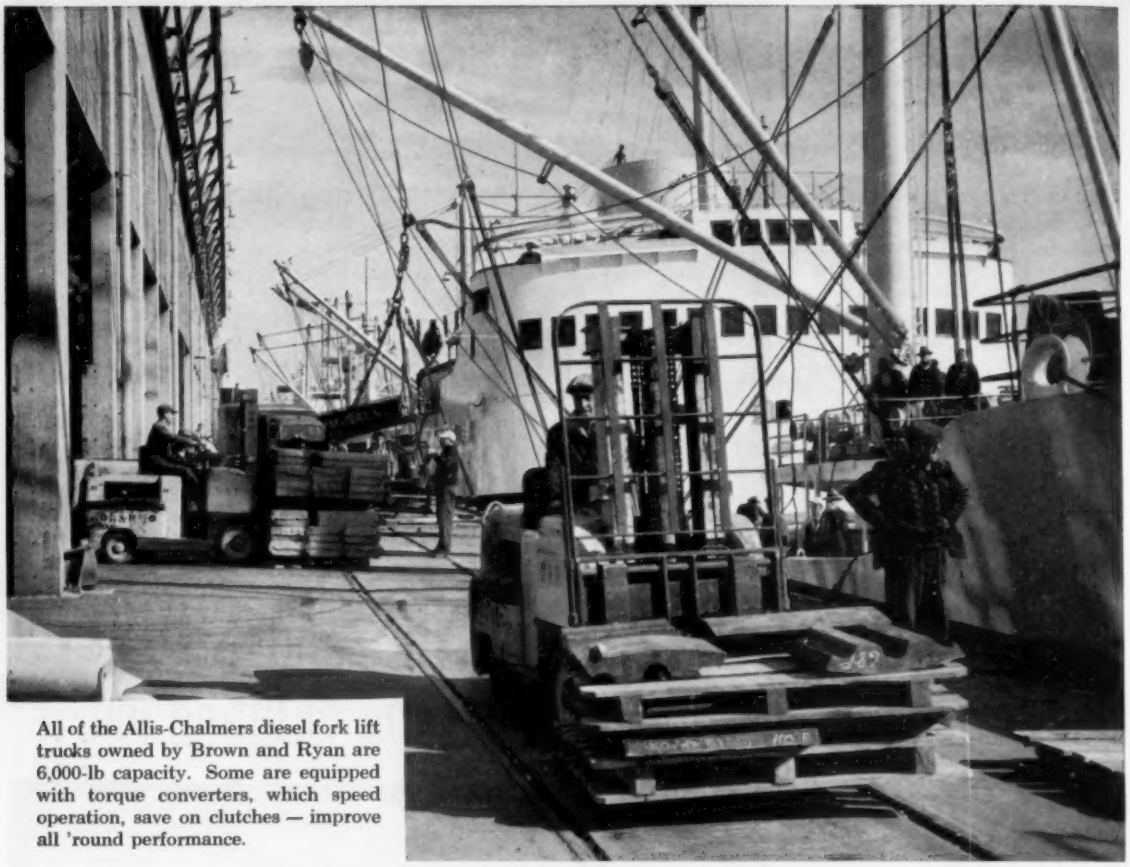

All of the Allis-Chalmers diesel fork lift trucks owned by Brown and Ryan are 6,000-lb capacity. Some are equipped with torque converters, which speed operation, save on clutches — improve all 'round performance.

Brown and Ryan Stevedores Cut Costs by Standardizing on Allis-Chalmers Diesel Fork Trucks

Brown and Ryan Stevedores of Montreal are gradually replacing their fleet of 45 gasoline-powered fork trucks with Allis-Chalmers diesel trucks. The performance of those already on the job testifies to the wisdom of their decision.

Fuel costs with the diesel trucks are but one-half what they were with gasoline units. During a typical eight-month period, according to Brown and Ryan, the cost of maintaining the Allis-Chalmers trucks was less than one-tenth that required for the company's other trucks. In fact, during the three years Allis-Chalmers machines have been used, handling from 30 to 40 tons of cargo an hour, not one has required major engine work.

Other diesel advantages are also apparent: There is no ignition system to cause sparks. The trucks are often stored overnight on the docks — with safety. This has earned them lower insurance rates. Further, there is no danger to personnel from carbon monoxide — diesel exhaust is non-toxic, an important factor when working in confined areas.

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Metal Drums Take On A Polyethylene Lining

Digested from CHEMICAL WEEK, May 12, p57

For some time, Delaware Barrel & Drum Co. (Wilmington, Del.) has been doing a nice little business in lining drums with polyethylene. But it has steadfastly refused to disclose how it applies the lining. Now, a patent just assigned to the firm reveals the secret: tumbling powdered polyethylene through preheated drums. The metal to be coated supplies the heat to fuse the polyethylene into a smooth, continuous protective coating.

DB&D's coating process permits application of heavy (8-30 mils) coatings. And it does not require highly skilled labor.

First Step: Processing begins with conditioning of the metal surface. Drums are washed, degreased and/or pickled to provide a surface that is completely free of surface oils and scale. Then, to improve adhesion of the coating, the metal is roughened slightly by mild sand blasting.

After surface conditioning, the drums are conveyed through an oven to be heated to the proper temperature for the coating operation. Conditions in this step are critical. The metal must store up sufficient heat to remain above the melting point of polyethylene throughout the entire coating buildup operation; but temperature must remain below that at which the plastic chars.

The optimum temperature, which depends on the thickness or cross-section of the metal and required coating thickness, ranges from 350°F. to 475°F. for drums of 12- to 18-gage sheet metal.

Coating Technique: Immediately after preheating, the drums are coated with polyethylene powder, which flows through as drums are rotated in a slightly inclined position. It is in this step that experience and know-how play a vital role.

The powdered plastic must be applied in such a way that particles in immediate contact with the hot metal surface soften and fuse into a single layer. As fresh particles come into contact with this base layer, heat transfer must be rapid enough to cause them to melt and become an integral part of the coating. Heat transfer and uniform distribution of the particles are assured by the wiping action of excess powder as the drum rotates.

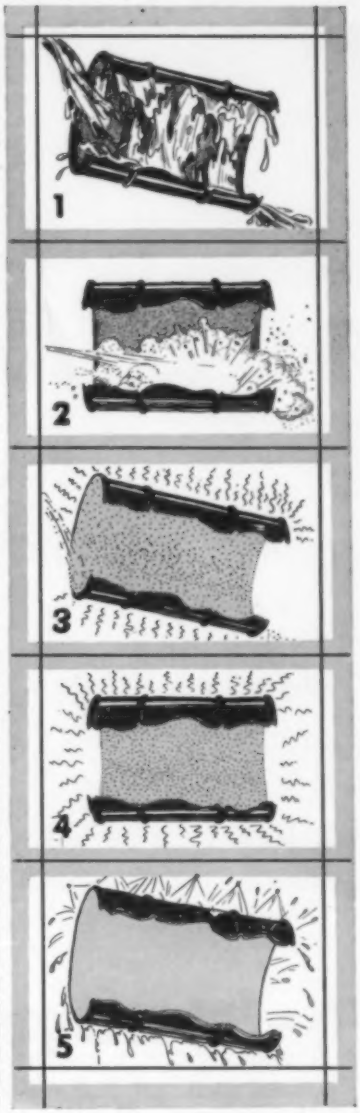
The use of excess powder also serves two other useful functions: It provides sufficient pressure to consolidate softened particles into the coating; it acts as an insulating blanket to retard cooling of the metal.

Overflow troughs extend inwardly at either end of the drum to receive the excess polyethylene, which is returned to the feed hopper for re-use. The lips of the drum rotate in these troughs to insure thorough coating at the apex of the chines—the points most prone to coating failure.

When the coating has built up to the required thickness, the drums are baked for about 20 minutes at 400°F. to complete the fusion and smooth out irregularities of the coating. The presence of oxygen in the oven atmosphere is also said to improve scratch resistance of the hardened plastic lining.

The coating process ends with a quench (water spray or cold air blast) that safeguards adhesion by causing the metal to contract faster than the coating. Finished drums are then spark-tested for coating porosity, and closed with drum ends previously coated in a similar manner.

Competition: Though the low cost (about $12) of a one-trip, plastic-coated drum makes it an attractive alternate for expensive stainless steel containers and breakable glass carboys, the fused-in-place polyethylene linings will not lack for competition. Various types of resin coatings offer cheaper protection (about 75¢ per coat) against many corrosive chemicals. And insert-type polyethylene liners are also bidding for shippers' favor.



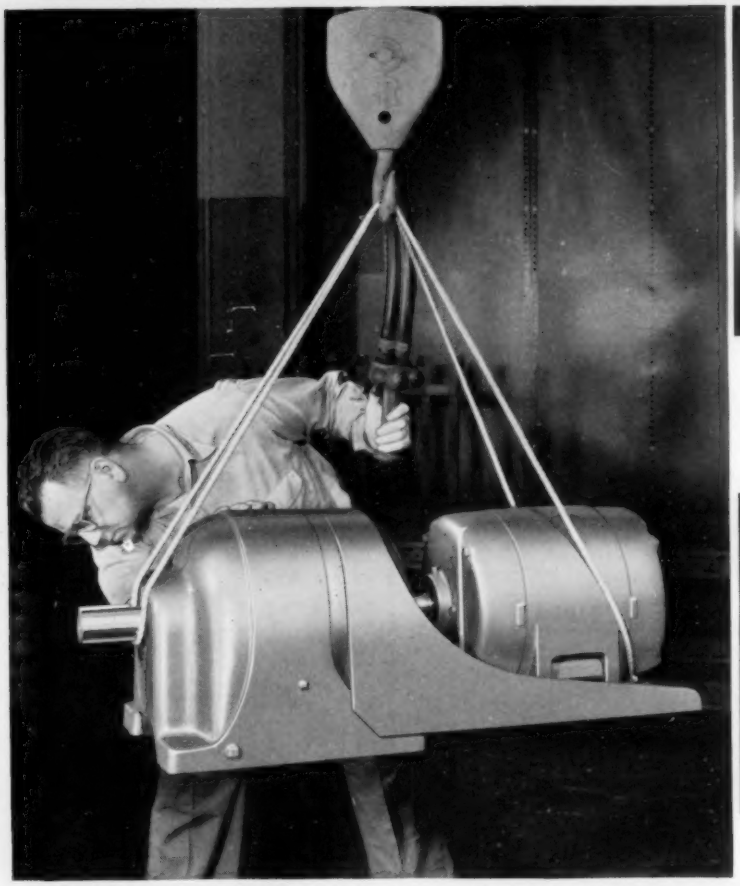
1. WASHING—The metal surface is cleaned and degreased.

2. BLASTING—Mild blasting removes oxide, roughens surface before drums pass through preheat oven.

3. COATING—Polyethylene powder is tumbled through hot drum, fuses, and sticks to metal.

4. BAKING—A pass through second oven completes fusion, smooths out coating irregularities.

5. QUENCHING — Accelerated cooling improves adhesion of finished plastic coat.



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Chlorine-Caustic For Small Plants

Digested from CHEMICAL ENGINEERING, May, p118

A new mercury cell, designed for the small chlorine-caustic user, invites "do-it-yourself" operation. First to try it is Power Station of Pretoria, South Africa. Formerly it bought chlorine, now it is a chlorine and caustic soda manufacturer.

Six of the new cells—developed by International Electrolytic Plant Co., Sandycroft, Chester, England—comprise the heart of the compact Pretoria plant. Output is 70 pounds per hour of chlorine, plus its equivalent sodium hydroxide (caustic soda). The Power Station uses the chlorine to arrest damaging cooling-water algae growth, and sells the caustic soda.

The British firm supplied most of the necessary accessory equipment as well as the cells—rectifiers, brine purification system, chlorine injectors, caustic liquor storage tanks. A selenium rectifier supplies direct current.

Complete installation at Pretoria cost only $42,000. This would indicate that International Electrolytic has beaten the long-standing deterrent to small mercury cell operations—high initial cost.

Other appealing features commended the system to Pretoria's specific needs:

- The power company had no access to skilled chemical operators—and the British system is simple to operate, has long life.
- The company did have a market for high-quality caustic soda—and the mercury cell produces 50% rayon-grade caustic directly, sale of which cuts down the net cost of chlorine.

International Electrolytic visualizes adoption of the new cell by textile mills, bleach solution producers, water-treating stations—and other small plants that want relatively small quantities of chlorine or caustic soda at minimum cost. Such users need only the basic raw materials—salt, water, electricity—to become a producer of chlorine and caustic soda instead of a buyer. ●

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Management's New Worry—Cash

● Companies—big and small—are awakening these days to find themselves profit-rich and cash-poor. They try to borrow and . . .

● They find the boom demand for money has pushed interest rates sky-high, and left bankers short of lendable funds . . .

● So many firms have been forced to revive "cash planning"—a nearly forgotten technique.

Digested from BUSINESS WEEK, Apr 28, p46

Profits are not the same as cash in the bank when it comes to paying your bills. In the midst of booming business, many an executive can be heard saying "My money is tied up in profits. I need cash for payroll and creditors!"

The trouble is that operating funds are all too easily drained away during any extended period of business expansion. Money gets tied-up in inventory to meet bigger sales demands; and as the sales are made, more and more money is temporarily "out of action" because customers buy on credit. You soon have a big "accounts receivable" item on the asset side of the balance sheet, but no cash. Here is an example showing what can happen to the small businessman who neglects "cash planning."

ABC Company made piston rings for $0.75 (75 cents) each and sold them for $1. Profit: 25 cents. ABC kept a 30-day inventory, and billed customers 30-days net. 1956 began this way:

Jan. 1—Cash on hand $1,000; inventory $750; accounts receivable $1,000. In January, ABC sold 1,000 rings at a cost of $750; collected receivables; profit $250. Thus:

Feb. 1—Cash $1,250; inventory $750; accounts receivable $1,000. During February sales were up to 1,500; ABC made 2,000 rings at a cost of $1,500; receivables from January were collected; profit to date: $625. Thus:

Mar. 1—Cash $750; inventory $1,125; receivables $1,500. Sales in March were 2,000 units; production was 2,500 units; collections were on time; operating results: $500 profit. Profit to date: $1,125. Thus:

Apr. 1—Cash $375; inventory $1,500; receivables $2,000. In April, sales hit 2,500; collections were on time; production was 3,000 units; profit for the month was $625. Profit to date was $1,750. Thus:

May 1—Cash $125; inventory $1,875; receivables $2,500. In May ABC sales were at 3,000 units; production—to adhere to inventory policy—was 3,500; profit for five-month period: $2,500. Then the books looked like this:

June 1—Cash on hand $000; inventory $2,250; accounts receivable $3,000. Thus, ABC was truly profit rich and cash poor—and went hurrying to its banker for a quick cash loan.

Many companies, like ABC, are hurrying to their bankers. Some are getting fast service. Many are not.

In the long period of "easy" money—low interest rates and a big supply of credit available, dating back over 10 years—management tended to forget about "cash planning." Now a whole series of events in many industrial nations has refocused attention on cash: (1) Cash requirements are suddenly at an all-time high; booming sales and production, big capital expenditures, and (in some countries) big tax bills, are the reasons; (2) the high demand for funds has pushed money rates way up (in the U. S. A., from 4% to 6% for commercial loans; in Britain, from 5½% to 7½%); (3) banks have been drained of lendable funds and are screening loans carefully, saying "no" to many marginal borrowers.

Even large corporations are having cash troubles. For example, General Electric Co. (U. S. A) had to borrow $100-million from banks to meet tax payments—and then arrange for a $300-million bond issue to add to its "working funds." GE says it will probably need more short-term loans "from time to time."

Cash planning, simply the study and control of the in-flow and outflow of cash, is once again being recognized as a vital management technique. When you deal with cash, profits are no longer the key. In fact, you can show small profits—even losses—and still be in a healthy cash position, and vice versa.

Without outside financing, a company's cash mostly comes from (1) sales, and (2) savings from former years' operations. There are some lesser sources, too—such things as dividends from investments in subsidiaries, sales of capital assets, tax refunds in case of losses, advances on long-term contracts. In boom times, though, it is doubtful that a healthy company will have offsetting losses on taxes, or a desire to sell capital assets. And a subsidiary may well be as short of cash as its parent company.

Businessmen find the "sales dollar" elusive; they see it on the books as "accounts receivable"—but not in the cash drawer.

In a highly competitive business—for example, electric appliances—more and more companies extend credit by delaying collections from retailers until the seasonal retail peak. This ties up cash, but is often necessary to assure future sales, and maintain a reasonably level production cycle. And when cash does come in, management may find it must quickly put the cash into inventory, raw materials, work in progress, and finished goods in wholesaler stocks.

Accounts receivable and inven-

tory, then, are the heart of the cash problem. Offsetting them are accounts payable—money owed but not due—and "accrued costs" like payroll and taxes. It is the balance and timing between these two sets of items that determines your cash balance

It is a paradox of cash planning that you can do a good job if business is level, stable. In a changing economy (when you need to know most about cash resources) planning is much more difficult.

Today, with cash demand high, bankers are forcing the average business to lay out some sort of schedule of ability to repay loans. Indeed, something amounting to a cash-flow sheet is becoming a borrowing requirement. Professor Charles M. Williams, of Harvard University's Business School, thinks that in the next few years detailed cash forecasts will become standard for business borrowers in the U.S.A., like the profit-and-loss statement is today.

Techniques of cash forecasting focus on the actual dollars coming in and going out in specific time periods. On the income side, it is not so important how much your sales are at any given time—but rather when you get paid and in what type of time cycle. The same is true of purchasing.

This brings new factors into your accounting. If you are paying your bills in 30 days but have a 45-day time lag in receipts, there is obviously a 15-day period of cash shortage. The idea is to anticipate the cash drain far enough ahead to avoid last-minute financing—especially in a market where money is often hard to borrow and interest rates are high.

Some companies are using mathematical models based on a "days-of-sales" ratio system. In the *Journal of Accountancy* (U.S.A.) the inventors of the idea tell how they analyze variables like (1) terms offered by suppliers, (2) terms offered to customers, (3) average days of "lead time" for inventory—and arrive at ratios for working capital needs in terms of daily sales. Such forecasts allow a company to try to rearrange "cash flow factors" to reduce the amount of cash needed at any one time. ●

▶ FINANCIAL DIGEST

World business is looking more to private American lenders, in spite of the shortage of lendable funds in the U.S.A.

The six-nation European Coal and Steel Community is giving "serious consideration" to the idea of raising a private loan in the U.S.A. So are **several major airlines in Europe and Asia.**

An ECSC loan would be used for modernization and expansion of coal and steel industries in Belgium, France, Germany, Italy, Luxembourg, and The Netherlands. The money would be borrowed by ECSC and then, in turn, loaned to private concerns in the six nations for modernization and expansion. In 1954, the Community borrowed $100-million from the U.S. government's Export-Import Bank; by mid-1955, the money had been distributed to European industry.

KLM Royal Dutch Airlines very recently closed a big loan from three American banks. The amount: $50-million. KLM will use most of the money to buy new jet airliners.

Scandinavian Airlines System (SAS)—owned by the airline interests in Norway, Sweden and Denmark—has already borrowed $30-million in the U.S.A. and is negotiating for another $20-million. **SABENA Belgian World Airlines** has recently borrowed $17-million in New York and plans to get $7-million more. And it is reported that **Lufthansa** (West Germany), **LAI Italian Airlines, Qantas Empire Airways** (Australia), plus **several Latin American carriers** are eyeing the New York money market.

Jet planes are behind much of the big borrowing. Costs are sky-high—SABENA, for example, will pay $25-million for four Boeing jets.

Meanwhile, speculation continues that **many major industrial corporations around the world may raise money in the U.S.A. by selling new security issues to Americans.** Two of the most frequently mentioned are **Royal Dutch Petroleum Co.** (which has already sought-and received-listing on the New York Stock Exchange) and **Montecatini,** the Italian chemical-metallurgical combine.

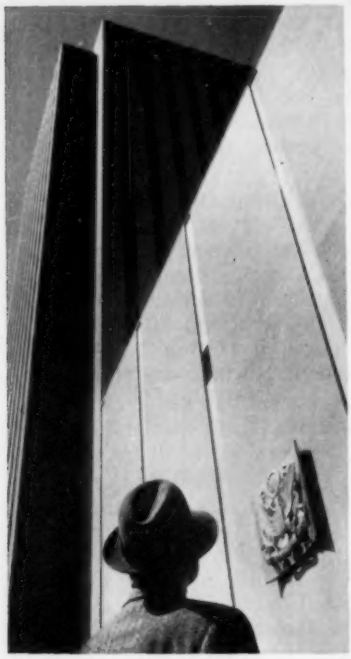
✦ ✦ ✦

The New York brokerage industry is becoming "big business." Take a look at the industry leader, **Merrill Lynch, Pierce, Fenner & Beane,** Wall Street. The magnitude of Merrill Lynch operations is eye-opening.

In the year ending with February, 1956, **Merrill Lynch took in nearly $82-million** from its nationwide operations. Operating expenses were $57-million. After deducting taxes, charitable contributions, employee profit-sharing and bonuses, there was $4.5-million to be divided among **107 partners.** As of the end of its accounting year, Merrill Lynch's assets were up to about $514-million. With its 116 nationwide offices, and with the aid of 88,000 miles of private wire, the firm handled 2,469,000 securities transactions in 1955. Average commission: $29.

Part of Merrill Lynch's success has come from its attempts to popularize stock ownership. In an effort to make the average-income man conscious of investment opportunities, Merrill Lynch—over the past 15 years—has spent $15-million for advertising and promotion, using radio, television, newspapers, mobile investment offices.

Financial Digest, compiled from various sources, analyzes current financial trends and underlying factors.



COLISEUM, just opened, aims at making New York one of the big trade fair centers of the world. Above is a view of

New York Opens an International

Digested from BUSINESS WEEK, May 5, p66; May 19, p30

The last word in exhibition halls is open for business—in New York City. Two of the first attractions were the International Auto Show, and the International Home Exposition (see pictures). At least 23 more shows, among them the first U.S. World Trade Fair, will parade through the $35-million Coliseum during the next 12 months.

City fathers want to make New York a leading trade show center in the world. They offer to exhibitors a shining new structure designed to house as many as four shows at once. It is really three buildings in one—an air conditioned trade show palace, a two-level garage, and a 20-story office building.

AUTO SHOW was Coliseum's first big international attraction. Above Sir William Rootes, displaying British-made Sunbeam Rapier.

Twenty-three nations have booked space for the U.S. World Trade Fair to be held from April 14 to 27, 1957. And 25 other countries have said they are interested.

About 100,000 merchandise buyers are expected to attend the World Trade Fair, and at least 1-million public visitors. Exhibits will be limited to eight product groups: clothing; home furnishings; china, handicrafts and allied products; housewares, sports, and electronics equipment; foodstuffs and beverages; office equipment; building materials; and basic commodities.

Meanwhile, many overseas businessmen plan to participate in those shows which are not strictly "international" in character. For

view of rnational Home Exposition.

na Marketplace

example, several nations have signed up for next October's U.S. "Fashion-o-rama" featuring clothing and textiles.

First big international attraction, the Auto Show, displayed 150 cars from six countries; 46 of the 150 were British. British auto makers featured sports models, as usual; but also emphasized cars—like Rootes Group's Rapier (picture)—that cater more to the American preference for comfort, bigness, two-tone color, power.

The home show featured four complete homes, with emphasis on gadgets, home automation, prefabrication. The Coliseum's 300,000 square feet of display space (on four floors) was more than ample. For what they paid in rent ($23,000 for main floor for two weeks) the exhibitors got everything they wanted except good maintenance service. This they complained bitterly about—thus far, the Coliseum's only growing pain. ●

War in the Soap Markets

Marketing battle rages in Europe and round the world. The weapons: Television, free samples, pretty girls, and price cutting.

Digested from THE WALL STREET JOURNAL, May 22

Many a normally quiet waterway in thickly populated England is foaming these days, with the drain-off from millions of sinks and washtubs. The foam comes from synthetic detergents poured away by housewives at a rate over half a billion pounds a year.

This swirl of bubbles is just one manifestation of an intercontinental detergents war that started in America and has finally hit all parts of Europe.

The antagonists: The giant British-Dutch Unilever organization and the two top American soap concerns, Procter & Gamble (Cincinnati), and Colgate-Palmolive (Jersey City).

In global markets Unilever is the giant leader, with sales of all its products—many of them far removed from the soap business—far surpassing the combined sales of its two big rivals. But the American concerns are striking some notable blows at Unilever's domain. Procter & Gamble's detergent invasion was a major factor in the post-war troubles of Lever Bros., the big U.S. subsidiary of Unilever which lost money as recently as 1953. In Britain, Unilever's home territory, P & G has now captured around 65% or 70% of the synthetic detergent market—but it has been bled heavily of profits in the process.

Procter & Gamble is crashing into the French market this year. Since January it has been deluging Paris and northeastern France with give-away samples and cut-price coupons. Now P & G is beginning to cover the entire nation. By early 1957 it will have a big new plant producing three detergents (Tide, Dreft, Daz) near Brussels, Belgium.

Colgate, too, is now making synthetic detergents in England and is selling heavily in Switzerland. It is building a new plant in southern Italy; the cost is probably not less than $2.5-million. And carrying the conflict to another continent, Colgate is building another detergent plant in Colombia.

Unilever is fighting back, of course. Having awakened almost too late to the threat of detergents in the American market, Unilever has rushed to build synthetic plants in almost every country in Europe, to hold its number one place in the soap business there. Additional new plants are now rising or recently completed at Olten, Switzerland; Mannheim, Germany; Milan, Italy; and Haubourdin, France—plus new facilities in St. Louis and Baltimore (U.S.A.), and in Boksburg, South Africa.

The invasion of the European continent by Unilever's two big American competitors may well bring the kind of price cutting that has swept Britain.

This corporate war has other fronts, too. A few weeks ago about 50 weird little Messerschmitt motorscooters, with enormous Gleem toothpaste packages mounted above their roofs, converged on London's Piccadilly Circus. Each had a loudspeaker blazing the news that P & G was introducing a new dentifrice to the British market. Gleem girls handed out samples to throngs of office workers. Within a few days free packets were handed out to every householder in southern England.

This was a challenge both to the top-selling Unilever toothpastes—Gibbs, Pepsodent, and Mentasol—and to the well-established Colgate brand.

Two months ago P & G introduced to the London area a new synthetic detergent (Cheer). Every housewife received a five-penny coupon redeemable against a box priced at two shillings, one penny. At the grocer's, every package of Cheer carried with it a give-away premium—a cellophane-wrapped bright yellow dustcloth. P & G official hint of other promotions.

Colgate is now pouring out

Palmolive soap and shaving cream, Ajax cleanser, Colgate toothpaste and other products from plants in a dozen European cities, from Stockholm to Milan. Within the past year Madrid has been added to the list. Colgate's European sales hit $75.3-million in 1955, up $12.9-million from 1954. It might not be far off if one guessed that the company is planning to raise this figure to $90-million this year, $100-million next year, $110-million by 1958, $125-million by 1959.

This will call for new Colgate plants, of course. One untapped country which has been considered as a factory site, for instance, is Portugal.

The tough competition is leaving some scars. Colgate's foreign subsidiaries, in Europe and elsewhere, suffered a $1.2-million drop in profits in 1955 as compared with 1954. P & G's British subsidiary, Thomas Hedley & Co., recently issued a belated report on the business year ending in June 1955. It showed that profits had dropped to less than one-third of the $3.2-million earned in the previous year, which was in turn below the year before.

The flood of promotional expenditures surges ahead at an impressive level. Unilever, for instance, spent $1.2-million on Britain's new commercial television during the six months following its opening last September. This was mainly for advertising two detergents, Surf and Omo. It spent $2.6-million in 1955 promoting these products in newspapers and magazines. P & G, in 1955, spent $2.9-million advertising Tide and Daz.

In spite of high pressure campaigns, the soap merchant selling in Europe must remember that the "soft sell" (a more conservative advertising approach) is what will produce the best results. This is the comment of a P & G expert. The customer cannot be bludgeoned into buying, he says. It is better to amuse him. In France, for example, much advertising is done by short animated and humorous cartoons in the moving picture theatres.

Another marketing lesson concerns the "giant economy size" (the big-quantity package sold at a reduced price). The giant size cannot be sold in France where housewives shop daily and will not buy goods in volume, even at a saving.

National pricing standards are entirely inconsistent, the soap men say. A bar of Colgate's soap which retails for 8 cents in the U.S.A. brings the equivalent of 6 cents in Holland, 12 cents in Germany, and 45 cents in France. Many middlemen, high taxes and high raw material costs account for the French price.

In spite of this, France is proving a surprisingly good market for synthetic detergents; these have captured 40% of the kitchen soap business. The German market, too, is developing fast. Britain, though, remains the big market; there the synthetics have taken over more than 50% of the kitchen soap market. Now Unilever, P & G, and Colgate—having passed through a great wave of price-slashing—are concentrating on promotion warfare. ●

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The 'Magpie' vacuum sweeper has been specifically designed for use in large factories, warehouses, hangars, etc., for the rapid and efficient cleaning of large floor areas without raising dust. All litter and refuse is swept up into a large container while airborne dust is drawn up and deposited into a separate dust tray—both container and tray are easily removed. The vehicle is exceptionally manoeuvrable for use in gangways and confined spaces. A special kerb brush enables sweeping to be done right up to the base of walls.

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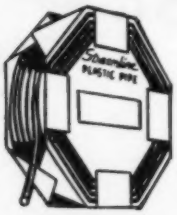
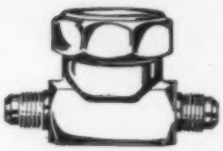
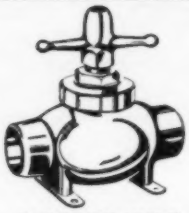


FLEXIBLE PLASTIC PIPE

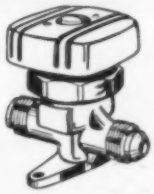
STREAMLINE SOLDER-TYPE FITTINGS



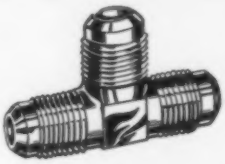
LIQUID INDICATORS



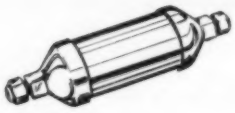
PACKED LINE VALVES



DIAPHRAGM LINE VALVES

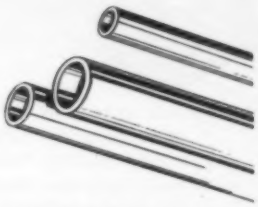


FLARE FITTINGS



DRIERS-STRAINERS

FORMED COPPER TUBE



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Nearly 200 "EUCS" already at work on the

Model 63TD "Euc" getting a heaped load of 20 cu. yds. at site of Long Sault Dam near Massena, N. Y.

Although work on the St. Lawrence Seaway and related New York Power Authority projects is just getting under way, close to 200 Euclids are already "digging in". They're helping build cofferdams, making diversion cuts, relocating highways and railroads, and preparing power house sites. Other "Eucs" are doing similar jobs on the Canadian side of the river.

One of the key projects in the whole Seaway program is construction of Long Sault Dam near Massena, N. Y., a joint venture sponsored by Walsh Construction Co. Others who have pooled their men and machines on this 7 million yard job are B. Perini & Sons Co., Morrison-Knudsen Co., Peter Kiewit Sons Co. and Utah Construction Co. . . . some of America's leading contractors. At present 50 "Eucs" are working on this one contract and others will be added as work progresses.

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What Next for Copper?

Look to copper's history and you can understand it today. Outlook: lower prices now; rising demand — and maybe price — in the future.

Digested from the TIMES REVIEW OF INDUSTRY, May, p13

Copper prices have in the past seemed to follow their own unpredictable rules, and thwarted the most experienced market operators. One explanation for copper's behavior lies in the structural changes in the copper market in the past quarter century. To understand them, start in 1900:

1900 to 1929: World mine production roughly quadrupled during this period, to almost 2-million tons. There was price stability in the first half of the period, but World War I seriously disturbed the balance. Prices began to move within wider limits. As a result the dominant American producers formed a world cartel, controlling nearly nine-tenths of supplies. But the cartel misused its power, raised prices sharply, and broke down as a result.

1930 to 1945: The break-up of the cartel coincided with the beginning of the great depression, during which copper fell to its lowest price—less than 5¢ a pound. And this second phase became one of extraordinary dislocations. The dislocations stimulated the full development of resources in younger producing countries; and drastically changed the status of the U. S. A. in the market.

The new producers—Canada, Rhodesia, Chile, the Congo—increased production from 335,000 metric tons in 1925 to almost 1-million tons in 1938. Virtually all this copper was low-cost—and that was reflected in lower prices. That helped bring the virtual abdication of the high-cost American producers as leaders of the market. They pressed for—and received—a prohibitive copper tariff, isolating the American market. In spite of this protection, production fell from 905,000 tons in 1925 to 505,000 tons in 1936; the country, once the major exporter, was reduced to bare self sufficiency.

More than that, the American events forced the new producers to develop market in the rest of the world.

World War II did not change the basic position of the industry. Prices were controlled; the industry had no war damage. What the war did was test the new resources developed between 1925 and 1938 to the full. In 1943, world production reached a new record of 2.8-million tons.

1946 to the Present: Full employment became a universal objective; civilian use expanded sharply; defense production made big demands on output. The U. S. A. was re-integrated into the world market—this time as a large importer. And it became obvious to many that demand would soon surpass present resources.

But the impact of state trading, deprived the market of a much-needed sensitive indicator. The full implications of the postwar changes were hidden. Remembering the difficulties of the inter-war period, producers were expecting a slump in price, and development of new resources lagged.

30¢ Copper?

As MANAGEMENT DIGEST went to press, copper prices seemed in the midst of the "major reaction" that the *Times Review* forecasts. From £ 436 a ton (54¢ a pound) in London in March, prices skidded to £ 337 on May 1, and on down to £ 293 early in June. How far will it go? In May, Ronald Prain, chairman of the Rhodesian Selection Trust, thought that the "bottom" of the market might be £ 240 a ton (30¢ a pound), and that a "reasonable" level might be £ 280 (35¢). Prain believed in May that the drop was "in the interests of the copper industry as a whole."

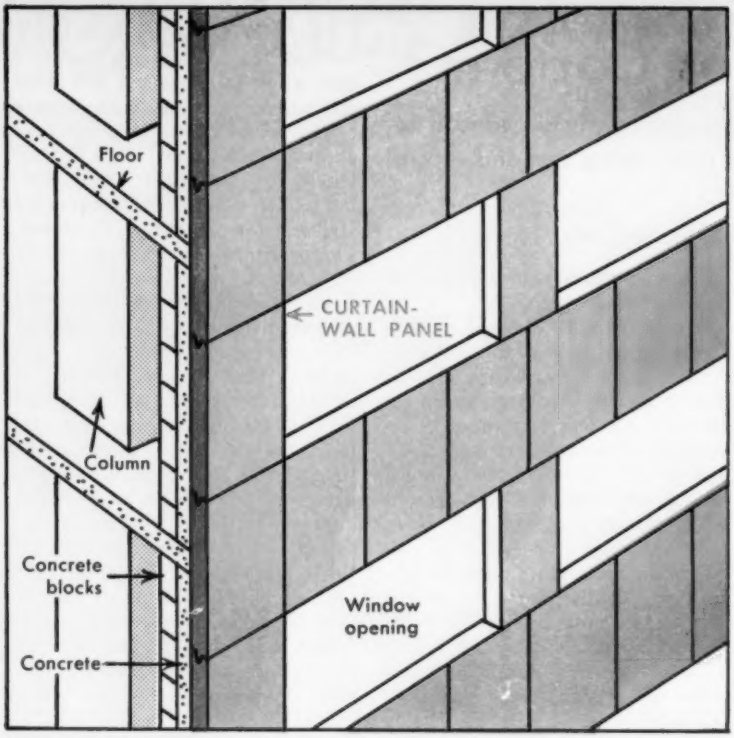
The Korean War boom confronted the world with the fact that growth in demand had done more than just absorb the excess of the prewar resources. Still, producers weren't convinced. Output lagged in 1953-1954; and, complicated by a series of copper mine strikes, the shortage developed. This shortage carried copper to its highest peak ever in London.

It is wrong to attribute the soaring price solely to the strikes. The primary cause is that while in the 1930s the development of new resources greatly outpaced growth in consumption, the last ten years has sharply reversed the situation. A large potential surplus gave way to a bare balance, which any sudden loss of output, or sustained rise in demand, must transform into an open shortage.

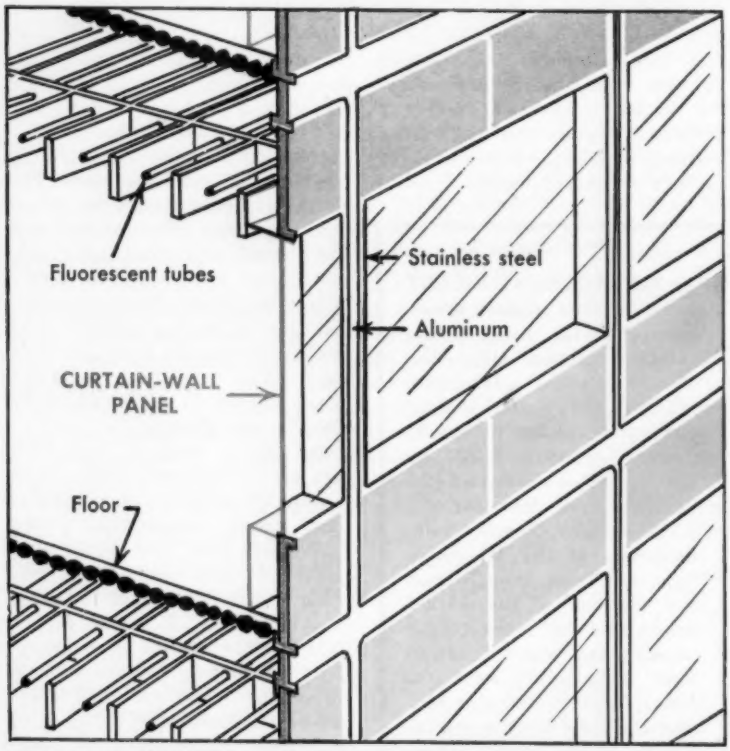
It may well be that, within the next few months, copper prices will experience a major reaction (See box). That would be because current consumption, after its sharp expansion for two years, has recently ceased to grow; and, partly because the high prices paid over the past 18 months have begun to make an impression on current production. A large number of submarginal mines became profitable, and their supplies help ease the shortage. But they will disappear fast in a price recession.

Meanwhile, prospects for big new supplies have improved. The U. S. government has supported home expansion projects which will add 300,000 tons to output within two years. And American public finance has made over $100-million available to foreign projects—like the huge Toquepala development in Peru. Also, expansion is going ahead rapidly in Chile, Rhodesia, Uganda, and Canada.

But don't overlook that fact that last year, when world output jumped 7% to just under 3-million tons, world consumption passed 3.25-million tons. The recent stagnation in consumption may help bring prices down to a more appropriate level. However just a little further growth in consumption over the next few years would revive open shortage. And there can be no doubt that, in spite of increasing substitution for copper, the long term trend of copper consumption is upward. ●



PRECAST CONCRETE PANELS, 6,000 of them, went into the Workers Apartment House, Buenos Aires, Argentina. Panels are backed up with blocks.



GLASS CURTAIN WALL weighs only 9 pounds per square foot. Owner is Connecticut General Life Insurance Co. (Hartford, Conn. U.S.A.)

▶ CONSTRUCTION

Curtain Walls

Digested from INGENIERIA INTERNACIONAL CONSTRUCCION, June, p44

Slowly, but surely, architects around the world are discarding conventional methods and materials for walling-in a building. A new technique began to evolve when architects started thinking that piling masonry 30 stores high just to cover a building did not make sense. The wall supports nothing. Its only function is to keep weather out and help control the climate inside.

The architects new thinking revolves around covering a building with lightweight panels, or "curtain walls." The materials are usually concrete, aluminum, or stainless steel—and even bronze is being used. And the panels are prefabricated for quick, easy erection. Prefabrication means, of course, mass production of a building wall in a factory under ideal conditions. Indeed, the architect's increasing interest in metal curtain walls presents a major new opportunity for metal fabricators, large or small, throughout the world.

In Latin America and in Europe, emphasis has been on lightweight precast concrete panels. But in the U. S. A., the trend is toward combining metal and glass into a panel sometimes two stories high. This concept opens up a wide range of design for the architect. Still another reason for the growing acceptance of metal wall panels is that they are lightest in weight. This advantage permits the use of a lighter, less costly structural framework.

The architect has these materials to choose from:

- Concrete—it will continue to be important as long as metals remain in short supply.
- Steel—covered with porcelain-enamel.
- Aluminum—plain or textured surface, special finishes, porcelain enamel coatings for color not protection.
- Bronze—plain or textured surface, special finishes.

Textured surfaces seem to be

rchitects' Tool for the Future

the architects' prime choice. They hide minor surface defects and help dirt accumulation blend into the pattern. Porcelain enamel on metal sheets opens an almost unlimited range of colors to architects. Panama City's new Legislative Palace will have green-enameled steel panels.

Biggest problem with metal curtain walls is sealing the joints between panels. Wind leakage could upset heating and cooling systems. And wind-driven rain would mean, at best, a damp interior. Joints can be made weather-tight by resilient gaskets, by interlocking or spring action in the joint itself, or by periodic application of a sealing mastic. The latter requires considerable maintenance—constant expansion and contraction of the panels causes the mastic to fail in a relatively short time. Experience indicates that interlocking and spring-type metal weatherstrip performs best.

Still another problem is that of temperature effects. Changing temperature causes the panels to expand or contract. This movement has to be taken up in the joints between panels. Total metal movement across a steel-panel building front 10 stores high may be more than 1 inch from a cold midnight to a sunny mid-day.

Heat transmission through the walls has to be guarded against, too. So all metal curtain walls have a layer of insulation between the outer panel and the interior wall. When insulation is placed between two metal skins you have a sandwich panel. Usually metal fasteners tie the insulation to the skins, but some panels are formed by bonding the skins to the insulation with adhesives.

The use of adhesives is likely to be more important in the future. For one thing, they eliminate heat losses through the metal fasteners. Right now, research is in progress with the aim of finding the ideal adhesive. Neoprene works well. Resorcinol-phenolic adhesives provide a strong but brittle bond. A primer is necessary to make the adhesive stick. Epoxy resins are promising but high cost is a drawback.

Researchers are also looking for the ideal insulating material. They are studying the foamed plastics. Polystyrene, foamed in place, can increase the insulation value of a honeycomb core. (Resin-impregnated paper formed in a honeycomb shape makes up the core of some building panels). The plastic foam is light and moistureproof. Another foamed plastic, Dow Chemical Co.'s Styrofoam, has about the highest insulation value.

These are the insulating materials generally in use today:

- Glass fiber—Practical with mechanically bonded panels. In adhesive-bonded panels it has a tendency to split into layers.
- Foamed glass—Non-flammable and has a high compression strength.
- Asbestos-cement board is recommended as a core material for thin panels or as a reinforcing sub-skin in thick composite panels.
- Wood-fiber board, in a waterproof grade, is cheapest.

Erecting a curtain wall presents a few unique problems to the builder. The panels that make up the curtain wall have a dimensional accuracy which the building frame cannot match. So attachment devices have to be carefully designed. They should permit putting up the panels from inside the building; they should be able to support the panels and they should be adjustable to permit aligning the panels.

Welding the panels to a steel frame is common. But bolting is preferable. In concrete framed buildings, some form of insert that will receive a bolt appears to be the best method of attachment.

One big advantage metal curtain walls have over masonry or concrete during the erection stage is that inclement weather rarely stops the metal panel erector. This, and other advantages, indicate that metal curtain walls will eventually form a major technique for builders everywhere. ●

Criteria for Curtain Walls

Durability: life expectancy of 100 years, minimum, 40 years.

Thickness: 2 inches ideal, maximum 5 inches.

Weight: 5 pounds per square foot, maximum 15 pounds per square foot.

Strength: should resist 150 miles per hour wind.

Flexibility: provide for expansion and contraction.

Removability: panels should be easily removable for repair or replacement.

Sound transmission: reduction of 50 decibels.

Size: panels should have 25 to 100 square feet area.

Adaptability: to all types of building framing.

Erection: panels should be installed from inside the building with no outside scaffolding.

Attachment: should be simple, positive and adjustable.

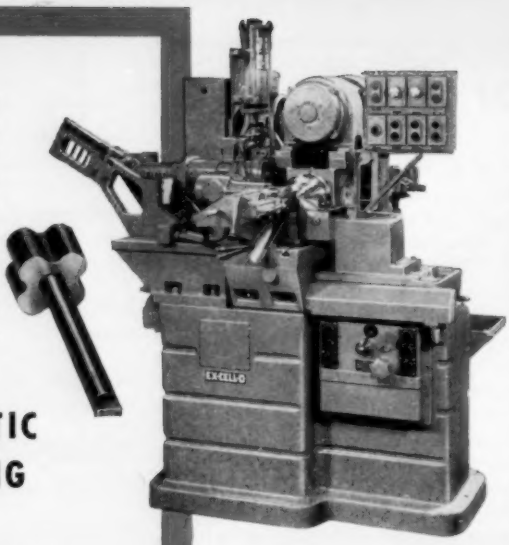
Handling: preferably by manpower.

Shipping: by standard transportation with no special precautions.

Appearance: panels should be attractive with no waviness and not too reflective, be available in a wide variety of textures and colors, should weather uniformly and be self-cleaning.

Maintenance: none should be required, but cleaning should be simple if desired.

Cost: competitive with conventional construction.



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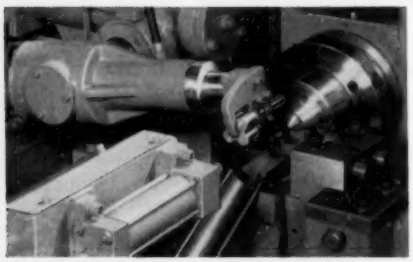

The loading arm is about to load the part into the chuck. After machining, part is ejected into chute in foreground.

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56-38

Trends In Construction

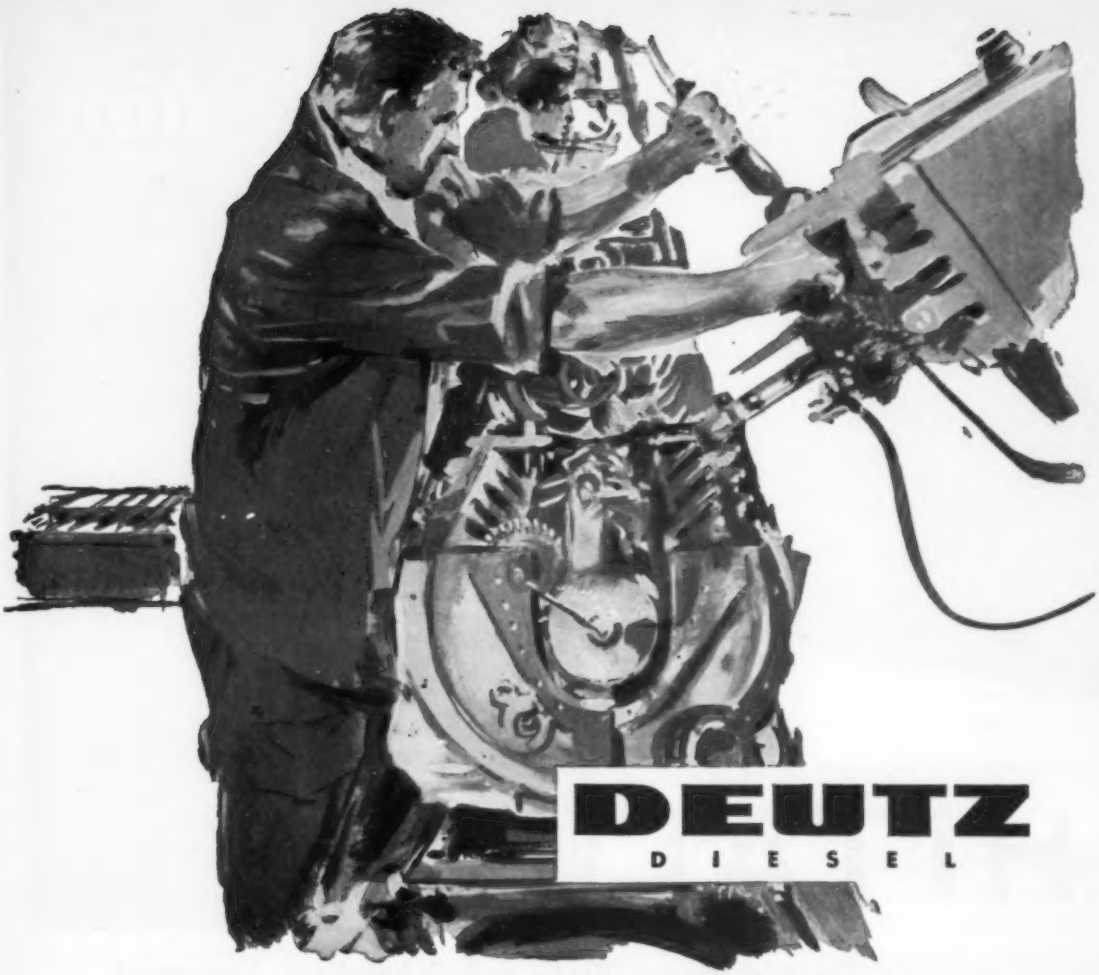
Brazil's tallest steel-framed building—21 stories—is under construction in Sao Paulo. Significantly, the National Steel Co. at Volta Redonda will supply all the needed steel. While Brazilian mills are not yet equipped to roll wide-flange beams, Volta Redonda can now turn out I-beams up to 20 inches deep. The new building will use 1,450 tons of structural steel, 350 tons more than the monthly output of Volta Redonda.

Canada may have a solar-heated house soon. The University of Toronto Mechanical Engineering Dept. is planning a two-story, five-room house, in which the entire basement acts as a 38,800-gallon water reservoir. The heat collector (glass and blackened metallic plate separated by air space) covers the south wall of the house.

A pump will circulate water from the bottom of the storage tank where it is coolest, through the collector where it will be heated. The heated water will then circulate through radiant coils in the floors, ceilings and some walls, which will provide a maximum heating surface for the house. From the radiant coils, the water goes back to the reservoir. Such an extensive heating surface will require a minimum water temperature in the radiant coils as low as 80°F. when outdoor temperatures are −10°F.

Japanese builders are putting the finishing touches on what was one of the world's toughest dam-building projects. The Sakuma hydroelectric site lies in the granite hills of the Tenryu Valley, whose slopes often defy even mountain goats. But it is an ideal location. It is midway between, and only 150 miles from Japan's two largest load centers, Tokyo and Osaka. Sakuma is 965 feet wide and 504 feet high, will supply 350,000 kilowatts of much needed electricity for Japanese industry.

Digested from Architectural Record, Engineering News-Record



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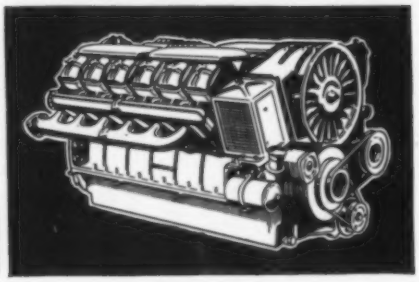
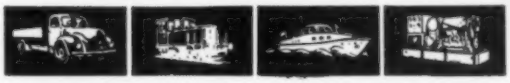
began in 1948 to build air-cooled diesel engines in large series. 7 years after, in 1955, the oldest engine manufacturers in the world had built and sold 150.000 air-cooled DEUTZ diesel engines totalling 7.5 Million B.H.P. These equipment engines are used all over the world for every kind of application. DEUTZ builds air-cooled 1 to 12-cylinder diesel engines with an output range from 5 to 250 B.H.P. for road vehicles, rail vehicles, water craft, working machines in all fields of application, generator sets for stationary and mobile electric and power plants.





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BRUSHWORK: New materials with new properties make . . .

New Coatings for Concrete

Digested from CHEMICAL WEEK, Apr 21, p46

Coatings for masonry—concrete, brick, stucco—may well provide a growing market. Masonry should be painted to enhance appearance, improve water resistance, and to provide a decorative, yet durable, surface. New products, now coming on the market, are designed to awaken the masonry owner to these facts.

The exterior paint market is likely to be the largest. Such solvent-thinned materials as styrene-butadiene and chlorinated rubber, and water-emulsion products made with acrylics, polyvinyl acetate, and styrene-butadiene are competing for top position in the U. S. A. market.

For interiors, particularly floors, styrene-butadiene solvent coatings and those based on chlorinated rubber have the cream of the market. But they have some drawbacks. They need much preparation and have a high solvent odor.

One of the new products is Luminall Paints' (division of National Chemical & Manufacturing Co., Chicago) concrete-floor paint. It has three promising properties:

- It needs no acid etch to prepare the floor.
- It is virtually odorless.
- It dries in less than one hour.

Another coating with big potential is a vinyl toluene resin paint under development by Goodyear Tire & Rubber Co., Inc. It is said to have far less odor than conventional solvent-type concrete paints.

There are several apparent physical differences distinguishing floor paints from stucco (exterior) finishes. The floor paints are enamels—produce a thick, glossy film, high in resin content. Stucco paints have a high solids content, which is much less resin, more pigment.

For exterior use, there has been increasing emphasis on silicones —either alone, to produce colorless water-repellent surfacing, or in combination with other paint elements. The silicones appear as water repellents in emulsion-type masonry paints.

One thing these coatings will not do is hold back water under pressure. Sealants applied from the inside are available for the purpose. But the best treatment against water is from the outside.

Another problem with masonry finishes: Until they become easier to apply, they won't be as popular as their qualities would suggest. ●

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New Equipment for Moving Materials

TWO exhibitions point up the latest trends in materials handling equipment. Last month's Materials Handling Institute Exposition in Cleveland, Ohio, showed major interest in industrial trucks and attachments.

Britain's Mechanical Handling Exhibition reflected the nation's growing concern with "automation" equipment and, like the U. S. show, displayed a trend toward better mobile handling tools.

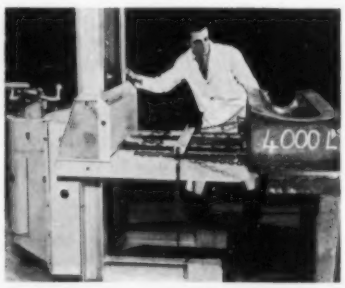
You will find a sampling of this new equipment on these pages.

Portable elevator is a hydraulic foot lift for loads to 750 pounds. Load is lifted by pressure of operator on pedal. Height is 83 inches; lifting height, 71 inches; platform, 24x24 inches. Unit rolls on anti-friction bearings. **(Barrett-Cravens Co., 4613 S. Western Blvd., Chicago 9, Ill., U.S.A.)**

Streamlined fork truck has been designed to user specification. The two major controls—forward and reverse, and lift-lower and forward-reverse tilting—are located, automobile style, on the steering column. Only the controls for the truck's attachments are located on the dashboard. A four-inch foam rubber seat is adjustable. The truck features torque-converter drive to avoid clutch trouble; and there is no clutch pedal. The first models, 2,000-, 3,000-, 4,000-, and 5,000-pound solid-tire and 2,000-, and 4,000-pound pneumatic-tire trucks —will all be gasoline powered. **(Clark Equipment Intl., Buchanan 4, Mich., U.S.A.)**

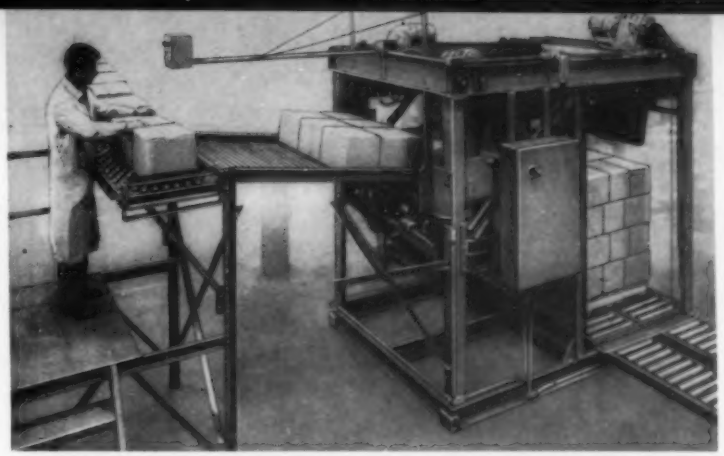
Swivelling-mast fork truck is designed to handle long loads such as pipes and timber. Picked up in the ordinary manner, load is withdrawn from the stack with a combined steering and mast-slewing maneuver and then carried alongside the truck, allowing minimum width and short overall length for maneuverability. Capacity is 12,000 pounds. **(Ransomes & Rapier Ltd., Waterside Works, Ipswich, England)**

Front-end loader has a 91½-horsepower engine in rear, full power shift transmission and torque converter drive. It also features a 40 degree bucket tip-back at ground level, an adjustable operator seat, a closed hydraulic system with pressure control and a 1¾ cubic yard capacity. **(International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill., U. S. A.)**



Self-loading tool and die handler has push off-pull on attachment controlled by an 8-inch crank operating a pair of conveyor chains for moving the load. Bar and chain sling are provided for moving load when off the table. Unit is mounted on a Matling Ltd. fork truck. **(Talbot-Ponsonby & Co. Ltd., Langrish House, Langrish, Near Petersfield, Hants., England)**

Conveyor handles heavy machinery through welding and other production and assembly stages. Such machinery, and structural steelwork too, formerly had to be moved by overhead crane. A roll-race conveyor in use today carries a total of 1,200 tons with only one 2-horsepower motor. Another conveyor has a 4,000 pound unit load and reversing mechanism, driven by a 1/10 horsepower motor. **(Conveyor Cafeterias Ltd., 70 Marylbone Lane, London W. 1, England)**



Shake motion empties boxcar. A new unit, known as the Kar-Flo, takes a standard railroad boxcar weighing up to 150,000 pounds loaded, locks it in its grasp on a steel structure, and then, by means of a gentle oscillating or rocking, empties the load. The car is not affected in any way by this rocking operation.

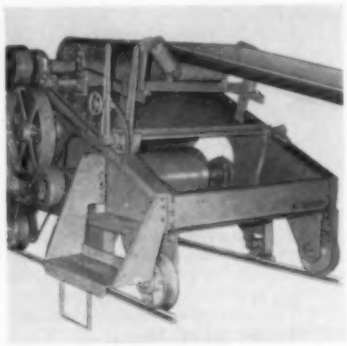
The entire unit can be installed in a pit 7 feet 3 inches deep. Most of the unloader is out of sight. The visible portion consists of a pair of rails mounted on a platform next to the receiving hopper, and an operator's platform with control center. The rail furthest from the operator's platform is 8 inches higher than the nearer rail. This produces the necessary 8° side tilt toward the receiving hopper. **(Link-Belt Co., 233 Broadway, New York 7, New York, U.S.A.)**

"Cart-N-Grab" arms for lift trucks will accommodate packages from 22½ inches to 70¾ inches. The "Cart-N-Grab" holds entire package firmly, eliminating any spillage or damage. **(Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore., U. S. A.)**

Trolley conveyor — A new, non-powered overhead trolley conveyor can be adapted easily for use in narrow aisles. Feature of the new conveyor is a four-wheel trolley which is hand-pushed on a monorail. Switches and track bends are available so that horizontal directions of the system can be changed, thus increasing the flexibility of the conveyor. **(Rapids-Standard Co., Inc., Grand Rapids 2, Mich., U.S.A.)**

Automatic palletizer transfers packages from the end of a conveyor system to pallet system. Operator arranges packages, presses a button, and packages are loaded by machine on the pallet. **(Paterson Hughes Engineering Co., Bedford House, Bedford St., London W. C. 2, England)**

"Trackmobile" operates with equal efficiency on both rail and road. Within easy reach of operator in cab are all controls for raising and lowering road wheels, for coupling and uncoupling. The Trackmobile can develop enough drawbar pull to push or pull a number of loaded cars. **(Whiting Corp., Harvey, Ill., U. S. A.)**



Belt-conveyor tripper accommodates long center roll, deep-troughing idlers. It is designed for belt conveyors handling light materials (grain, wood chip). **(Stephens-Adamson Manufacturing Co., Aurora, Ill., U. S. A.)**

Short lift truck is only 67 inches long. The short length permits comfortable operation in aisles as narrow as 10 feet, 6 inches. **(Yale & Towne Manufacturing Co., 11,000 Roosevelt Blvd., Philadelphia 15, Pa., U. S. A.)**

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Electronic Noise Analyzer

A new electronic instrument, called Soundscope, tracks down and analyzes industrial noise. Its main work will probably be in factories and mills to prevent occupational deafness. However, it can also be used in scientific research and to check on compliance with noise regulations.

The unit weighs only 20 pounds and is said to do testing jobs that ordinarily require as many as four different instruments. It measures a general sound level over the range of 24 to 150 decibels and breaks down the overall noise into eight frequency bands to determine the source of each noise. **(Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa., U. S. A.)**

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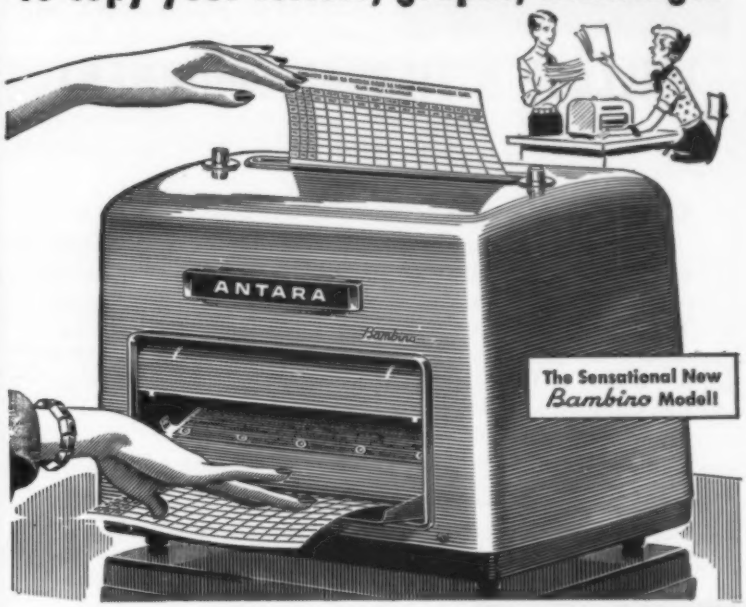

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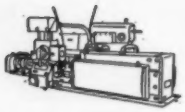

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Translation Trouble?—In an age of greater international communication, monolingual dictionaries have become more important to the precise reading and translating needs of the engineer, scientist, and businessman. UNESCO Publication 300 defines technical terms, and contains a classified index of standards from 27 countries. Price: $2.50. (Book Store, United Nations Building, New York, N. Y.

Controlling Air—All phases of air control—filtering, heating, ventilating, cooling, and dust control—are described in Bulletin 516. Bulletin 270-E3 shows how more effective exhaust hoods have been designed for the woodworking industry. Bulletin 234-C explains the application, operation, construction and performance characteristics of the Auto-AIRMAT automatic dry-type air filter for textile mills and other specialized applications. (American Air Filter Co. Inc., 215 Central Ave., Louisville, Kentucky.)

On-The-Job Safety—"The Story of Safety" describes and illustrates the industrial accident-prevention program of the du Pont Company. (E. I. du Pont de Nemours & Co. Inc., Wilmington 98, Delaware.)

Good Lighting—Extensive illustrations plus text make this 104-page booklet on lighting a handy reference guide. Written in eight parts, it covers: physics of light, light control, light and color, quantity and quality of illumination, and design of lighting systems. (International General Electric Co., 570 Lexington Ave., New York 22, N. Y.

Decision-Making—Harvard Business Review has published reprints of important pioneering articles on decision-making function in management. Some of the topics: statistical decision making, operations research, accounting for productivity changes, guides to inventory policy. Price: $4.00. Specify "Statistical Decision Series." (Reprint Dept., Harvard Business Review, Soldiers Field, Boston 63, Massachusetts.)

OEEC Publications—Here are several publications which you may find of interest: "Productivity Measurement," Vol. 2, gives a brief account of what has been done in this field in various European countries. Price: $1.50 or 500 F. fr. . . . "The Textile Industry In Europe" studies the evolution of the European textiles in 1954-55. Price: $1.25 or 400 F. fr. . . . "The Non-ferrous Metal Industry in Europe" includes a series of studies concerning the movements of each metal on the world market. Price: $1.00 or 350 F. fr. . . . "The Electricity Supply Industry In Europe" gives a brief description of the present situation, and considers general developments in the electricity sector up to 1960. Price: $1.50 or 500 F. fr. . . . You can ask for a catalog of other titles. (European Productivity Agency, OEEC, 2 Rue Andre Pascal, Paris, France.)

The Publisher Says . . .

I would like to send a transatlantic appreciation to the excellent British publications that we study each month in our effort to "do the worthwhile reading for you." You will find them well represented in this month's MANAGEMENT DIGEST.

Petroleum Press Service, a journal of world oil industry opinion, contributes to a look-ahead in that crucial field on page 9. On page 10, the great issue of "automation" and labor relations is described by two eminently qualified publications: *The Economist*, one of the world's most respected "journals of opinion," and McGraw-Hill's own *Metalworking Production*. You will find in that story some particularly timely editorial comments by our colleague Norman Stubbs, editor of *Metalworking Production*.

For "Product Digest," elsewhere in this issue, Mr. Stubbs sent us news of British materials-handling equipment. And last, but by no means least, *The Times Review of Industry's* provocative analysis of world copper is presented in our "Raw Materials" department.

We also digest from *Rubber & Plastics Age*, *Plastics*, and *The British Motor Ship;* soon we will add other British publications to our regular digest list. And our editors study a host of other publications—bank reviews, newspapers, company reports, from many countries—in their continuing search for information on the world of business management.

Charles S. Mill

Publications Digested

McGraw-Hill Publishing Co., Inc.
330 W. 42nd St., New York 36, N. Y.

American Letter
American Machinist
Aviation Week
Business Education World
Business Week
Bus Transportation
Chemical Engineering
Chemical Week
Coal Age
Construction Methods & Equipment
Control Engineering
Electrical Construction & Maintenance
Electrical Merchandising
Electrical West
Electrical Wholesaling
Electrical World
Electronics
Engineering & Mining Journal
E&MJ Metal & Mineral Markets
Engineering News-Record
Factory Management & Maintenance
Fleet Owner
Food Engineering
Industrial Distribution
Ingeniería Internacional Construccion
Ingeniería Internacional Industria
Metalworking Production (London)
National Petroleum News
Nucleonics
Petroleum Processing
Petroleum Week
Power
Product Engineering
Textile World
The American Automobile
Today's Secretary

Advertising Publications, Inc.
200 E. Illinois St., Chicago 11, Ill.
Industrial Marketing

American Bankers Association
12 E. 36th St., New York 16, N. Y.
Banking

American Management Association
1515 Broadway, New York 36, N. Y.
Personnel

American Society for Metals
7301 Euclid Ave., Cleveland 3, Ohio
Metal Progress

Bill Brothers Publishing Corp.
386 Fourth Ave., New York 16, N. Y.
Sales Management

Breskin Publications
575 Madison Ave., New York 22, N. Y.
Modern Packaging *Modern Plastics*

Dartnell Publications, Inc.
4660 Ravenswood Ave., Chicago 40, Ill.
American Business

F. W. Dodge Corp.
191 W. 40th St., New York 18, N. Y.
Architectural Record

The Economist Newspaper, Ltd.
22 Ryder St., London S.W. 1, England
The Economist (London)

Fritz Publications, Inc.
431 S. Dearborn St., Chicago 5, Ill.
The Paper Industry

Harvard University
Soldiers Field, Boston 63, Mass.
Harvard Business Review

Industrial Publications, Inc.
5 South Wabash Ave., Chicago 3, Ill.
Ceramic Industry

Keeney Publishing Co.
6 N. Michigan Ave., Chicago 2, Ill.
Heating, Piping & Air Conditioning

Petroleum Press Service
91 & 93, Bishopsgate, London E.C.2, England
Petroleum Press Service

Petroleum Publishing Co.
211 S. Cheyenne Ave., Tulsa 1, Okla.
The Oil and Gas Journal

Printers' Ink Publishing Co., Inc.
205 E. 42nd St., New York 17, N. Y.
Printers' Ink

Rubber and Technical Press, Ltd.
147 Grosvenor Rd., Westminster, London, S.W. 1, England
The Rubber and Plastics Age

Simmons-Boardman Publishing Corp.
30 Church St., New York 17, N. Y.
American Builder, Marine Engineering, Railway Age, Railway Track and Structures, Railway Locomotive and Cars, Railway Signaling & Communications

Temple Press Ltd.
Bowling Green Lane, London E. C. 1
Plastics, The British Motor Ship

The Times Publishing Co., Ltd.
Printing House Square, London, E. C. 4
The Times Review of Industry

Welding Engineer Publications, Inc.
12 East Grand Ave., Chicago 11, Ill.
Welding Engineer

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